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**“The Editor, Journal of Agriculture, Victoria Square, Adelaide.”**

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CLARENCE GOODE,

*Minister of Agriculture.*

## POINTS FOR PRODUCERS.

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### Stallions Slow at Service.

At the commencement of the season it is quite a general thing to receive a number of communications reporting that stallions are slow at service. The very fact that these complaints are, as a rule, confined to the early part of the season, should indicate that in due course Nature will regulate the trouble without the intervention of drugs. The use of these, says the Veterinary Lecturer (Mr. Place) is much to be decried. In any case, they are only stimulants, and do not produce good results. A correspondent, seeking advice on this matter, was recommended by Mr. Place to try half a pound of desiccated malt or malt and carbonate of iron, both of which are prepared by veterinary chemists. Given in the morning feed they will have a better result than drugs; or a quart of stout in the feed daily for a week or so will often do what is required.

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### Maggots Inside of Sheep's Horn.

A correspondent from the North was somewhat bewildered on finding fat maggots drop from the horn sawn from a 6-tooth wether. Others were found inside the horn, and these, together with the horn, were forwarded for inspection. The Veterinary Lecturer (Mr. Place) says:—"The specimens received are larvæ of the fly *Oestrus ovis*, common in all parts of the world. The fly is rather larger than a house fly, yellowish grey, and slightly hairy, fine silky down at base of wings; length of body, 10-12mm. (one millimetre equals one-twenty-fifth of an inch approximately). It flies only in dry warm weather during the summer months, hiding in holes till mating time, when it may be found on warm rocks, &c. The impregnated female then seeks sheep, which are afraid of her, and bury their noses in dust or between their forefeet, but when they are sleepy and chewing their cud she lays eggs on their noses, which they try to rub off and often get sore noses on account of the vigor they use. The larvæ hatch out of their tiny kidney-shaped eggs and wander up the nostrils, taking about 10 months to undergo different changes (those sent appear to be about seven months). In these wanderings the larvæ get into the sinuses (hollows) of the face and into the horn sinuses, which communicate directly with the face, explaining the mystery of their being found in the horns. When ready as soft reddish nymphæ they are sneezed out of the nose. They spend about six weeks as pupæ, dark and

brown, and then hatch out as perfect flies; their history being very like that of the botfly of the horse. Preventive treatment consists in dressing the noses with something that sticks and smells, such as a mixture of fish oil and Stockholm tar—a rather large order for an Australian flock; but in a small mob this can be done automatically by smearing the mixture on old bags with small holes in them and putting them over rock salt, so that the sheep, in order to get the salt, poke their noses through the smeared holes and dress themselves. All maggots found on slaughter should be destroyed. Treatment.—Snuff does some good, but as the maggots are stowed away in the horns, &c., it does not shift them all. The fumes of burning tar shift a good many, but the best way is to bore a hole into the horn sinus at the base of the horn with an ordinary gimlet and squirt in a wineglassful of benzine one part, water four parts. The hole is plugged with tar after. All these fly pests are comparatively easily handled in their larval (maggot) stage, but it a hopeless job to go chasing them when they can fly, so a word to the wise is enough."

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#### APHIS ON CABBAGES.

"The members of the cabbage family are freely attacked by aphides (*Aphis brassicae*, Linn.) when grown during dry weather," says Mr. Quinn, in reply to an inquiry. "The water applied is not a factor in the propagation of the pest, only in so far as, if the water be unsuitable and the plants do not thrive upon it, they would be more likely to suffer more severely from the attacks of the pest than otherwise. The cabbage is not a success in this State during the summer months, excepting in the cool secluded gullies in the ranges. The heat causes the foliage to develop a tough glaucous epidermal coating, apparently to retard excessive transpiration, and this destroys that succulence of the tissue which makes the cabbage palatable and desirable. The aphides may be destroyed by spraying the plants occasionally with any aphicide such as kerosine emulsion, resin compound, or tobacco and soap wash. These remedies prove useful in keeping autumn-planted cabbages clean until the advent of the rainy season, when the blight practically disappears."

## INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

[Replies supplied by Mr. F. E. PLACE, B.V.Sc., M.R.C.V.S., Veterinary Lecturer.]

"N. K.," Leighton, has horse troubles—Subacute colic intermittently, especially after feeding.

Reply—Is it possible that the horses are watered after feeding? If so, gradually change round to watering first. The symptoms point to indigestion; worms may be involved in the affair too, but probably 10 drops tr. nux vomica on the tongue morning and evening for 10 days will put matters right. If it does not, then write again.

"J. P. G.," Warnertown, has a cow with hard quarter.

Reply—The symptoms point to simple inflammation of the affected quarter, and it would be well to bathe frequently with hot soapsuds, well rubbing and drying after; also give the cow 3lb. Epsom salts and 1oz. ginger in a quart of warm oatmeal gruel. If this does not put matters right then give her 10 drops of tr. phytolacca morning and evening on her tongue and bathe the udder with 20 drops of the same tr. in a tablespoon of glycerine.

"A. P. Y.," Port Broughton, had a foal three weeks, severely injured in stifle, leg much swollen, hard round joint with soft spot in front, unable to rise without help.

Reply—The symptoms well describe the disease known as joint felon, which is a specific disease commencing during life before birth and showing as described. It is difficult to deal with, but success follows the opening of the abscess when ripe and the cleansing of the sac with a 20 per cent. solution of acetozone (Park, Davis, and Company), also the internal administration of a wineglassful of the same solution twice a day after dressing the abscess. The drug is dear, but it is the only one likely to give a successful issue.

"A. V. S.," Hallett, states that a cow, not known to be in calf, was fattened for sale, but calved when almost prime beef; calf, as was likely from fat dam, was weak and did not suck, so cow was milked out (beginning of trouble), and seemed a little stiff; in evening, after being in a crop of wheat, seemed to hold milk; next morning at 8 appeared to be resting lying down, but would not get up (could not), and became uneasy; at 11 was slightly blown in spite of opening medicine given, and kept throwing head round to flank. At 1 much worse, and struggling and blown, back raked blood with dung hard; 3 p.m., opportunity for *post mortem*, all organs appeared healthy.

Reply—A typical case of so-called milk fever or drop after calving, excellently described by an observant man unacquainted with the disease. When first noticed she should not have been milked out, but the udder should have been distended with air, and the rest of the treatment often described given, and probably a quick recovery would have ensued. Points to notice—Cow fat, easy calving, indefinite symptoms at first, no inflammation, *post mortem* apparatus for treatment, a quill and bicycle pump.

"A. V. S.," Hallett, states that a mare has a milky discharge from bearing, always horsing, but not conceiving.

Reply—Chronic uterine catarrh, useless for breeding. If treatment is adopted, periodical douches of solution of perchloride of mercury, 1-2500 and 5grs. trit. merc. viv. twice daily on tongue for a fortnight, then tr. pulsatilla 10

drops similarly reverting to merc. v. after a fortnight's interval of rest; but the results will probably not compensate for the trouble, and she is likely to infect stallion.

"G. G. F.," Tintinara, reports foals troubled with furred sores in mouth and salivation.

Reply—The symptoms are those of acute stomatitis, and there is a possibility of others becoming affected on the same land, but not necessarily so. Should they, dress the mouths two or three times a day with a solution of a teaspoon of boracic acid in a pint of warm water.

"H. B.," Hanley Bridge, has horses with boils on shoulders and necks.

Reply—These are glandular enlargements, and the oats are partly responsible. Cut them off entirely and substitute bran for a few weeks, also give a tablespoon of sulphur to each horse once a day in feed for a week. Dress the boils three times a day with 2ozs. white lead shaken up in a pint of neatfoot oil; if at work, which is better, dress the collars also.

"P. D.," Lucindale, has a mare troubled with warts.

Reply—If the mare is a grey the following treatment will not answer, and other advice would be given on receipt of the information. If of any other color and the warts have a root, tie tightly with horseshair or slip the rubber ring of a soft drink bottle over them. When they have dropped off mix some Cooper powder dip with lard to a thick paste, about half and half, and apply to the root daily for a week or so. This should do away with the trouble.

"V. J. S.," Clarendon, reports that a sow has had several litters but does not conceive.

Reply—Drugs are of no use in this respect, although a German one, Yohimbin, has been much belauded. There are so many factors governing such a case that advice cannot be useful without a personal inspection. Try keeping her poor and giving stimulants, such as mustard and pepper, in the food.

"S. S.," Mount Compass, reports that a horse was afflicted with sudden lameness, followed by puffing outside knee, which does not yield to fomenting and rubbing.

Reply—There has been a strain of the synovial sacs of the extensor tendons, and there may be a permanent enlargement, especially as blistering has been carried out too early. Try rubbing in a little blue ointment (Ung. hydrarg.) once a day, and each evening bandage the knee with a bandage wet with a lotion composed of tr. arnica loz., meth. spirit  $\frac{1}{2}$  pint, water  $\frac{1}{2}$  pint.

"C. M. W.," Netherton, has mare, three years, which slipped foal, and is pining away, as there is a difficulty in feeding.

Reply—The natural upset of teething is increased by the constitutional disturbance due to slipping foal. It would be well to give her as much grey powder (hyd. e. cret.) as will lie on a sixpenny piece twice a day for a few days, then to give her ten drops tr. arsenicum twice a day on the tongue for a week.

"T. W.," Borrika, has a horse, seven years; every few weeks sheath swells.

Reply—This is due to bloodworms breeding. When next it occurs, give a tablespoon of sulphur and a teaspoon of saltpetre once a day in feed for a week or so, and afterwards give two tablespoons of Fowler's solution of arsenic once daily in feed for a fortnight. Also clean out sheath with soap and water.

"I. R. W.," Arno Bay, seeks advice regarding worm tablets for horses.

Reply—The tablets are not likely to deteriorate if kept in a dry place. It is not advisable to treat in-foal mares, but it is not necessary to wait till weaning. The tablets may be given to horses if desired; four crushed and mixed with a little damp bran in feed once daily for ten days or so would be a fair dose for one horse.

"J. W. H.," Taplan, has a cow which jumped through fences, cut and bruised teats; blood-stained milk.

Reply—Mix an ounce of tincture arnica with a pint of oak varnish, or less in proportions, and paint damaged parts of teats with it after each milking. Also give 10 drops of tr. arnica on the tongue twice a day for a few days.

"C. E. L.," Naracoorte, reports that a heifer, two years, gives stringy and bloody milk from one teat, otherwise health good.

Reply—The trouble seems to be at the root of the teat, where local inflammation is going on. Give her a drench of 1lb. Epsom salts, 1oz. sulphur, ½oz. ginger, in a quart of warm beer; rub the quarter well after milking twice a day with hot soapsuds, and report again after a week's treatment.

"L. R. C.," Lenroy, Pata, has a cow lame near hind leg, crack above hoof, bowels all right.

Reply—The trouble is probably inflammation of the interdigital gland, known in the old country as loore. Treatment:—Give a pound of Epsom salts, an ounce of sulphur, and ½oz. ginger in a quart of warm water. Poultice the foot with bran for a few days and then dress the hoof by rubbing a piece of old rope dipped in tar between the claws daily. Report progress in a fortnight.

"H. R. L.," Laura, has a mare, six years, drowsy, languid, and off feed.

Reply—The symptoms are common to many diseases, and generally point to digestive inefficiency, which should be remedied by the nux and arsenic, but it would probably be well to feed on bran mash only for two days and then give a six dram physic ball. When the effects of this have worn off, a week's course of Fowler will do good.

"E. L. W.," Karoonda, has a draught mare, 16 years, which cannot get up without help, sits up like a dog; every eight or nine days water is milky, thick, and smells badly, poor appetite.

Reply—This is a complicated case, probably of stomach abscess and sabulous deposit in the bladder, possibly also kidney abscess, and it is doubtful whether she will pay for treatment, but if desired give her a teaspoon of baking soda and ten drops of strong tincture camphor twice a day mixed in a little molasses and smeared in her mouth, also rub her back daily with a strong liniment containing turpentine.

"J. J. C.," Spalding, has a mare which does not seem in pain, but lies down and looks around, not eating, and seems as if trying to swallow and cannot; a thick watery fluid runs from nostrils and mouth.

Reply—The symptoms point to gastritis, which would arise after the heavy rains by the mare swallowing gravel, etc. It would be well to put her on to bran only, and give her 10 drops of tr. arsenicum and nux vomica alternately every three hours until improvement sets in, then twice a day for a few days. A post mortem on the other would have been a great help in diagnosing this. If a post mortem is made on this do not attribute death to the bots which will most likely be found.

"H. E. M.," Ashbourne, has a cow which calved three weeks ago, milked well for two weeks, then got sore teats and fell off in milk; constipation, red water, and staggers.

Reply—This form of red water is common after calving. It would be well to give a pound of Epsom salts and half an ounce of ginger in a quart of warm red wine; this will probably put the constitutional symptoms right, and the teats should be dressed after each milking with boric ointment. If the one dose does not put things right, repeat on the second day.

"F. T. D.," Port Neill, has a mare, three years, staked on side of face, healed all except small discharging pipe.

Reply—Probably if the place of discharge was covered once a day with a powder made of equal parts chlorinated lime and boracic acid it would cease to discharge in a week or two.

"F. C.," Coomandook, reports the birth of bull calf twin with heifer.

Reply—The heifer is the one usually impotent or sterile (freemartin), not being sexually complete, but the apparent bull is sometimes impotent too, so it would hardly be advisable to risk keeping him.

"D. K.," Wirilla, Manoora, has a cow which had difficult calving, is unable to rise, constipated, and passing bowel casts.

Reply—This form of paralysis after calving is not uncommon, and is difficult to cure. It would be well to give her two tablespoons of syrup phosphate co. (Easton) in a quart of beer twice a day for a week; this will

regulate the bowels as well. It is useless to attempt to sling a cow in such a condition, but she should be propped up comfortably and all her limbs well handrubbed twice a day. The best feed will be green stuff and crushed oats and bran.

"T. B." Carrow, has a black cow going blind, eyes turning milky, condition fair, in milk.

Reply—The trouble is caused by parasites in the blood cells producing anemia, which always manifests itself by the milky appearance of the eyes. As the parasites are transmitted by flies, it is of interest to note that the cow is black, a color very attractive to them. Have a dozen of the following powders made up and give her one twice a day in feed; if there is any improvement repeat for two more weeks:—Carbonate of iron 2 drams, sulphate of quinine 1 dram, arsen ox. 5grs., sugar to one ounce. If she will not take them in feed, drench in a little gruel. Every three or four days blow a small pinch of boracic acid into the eyes.

"A. W. L." Peake, has a mare due to foal end of September; greenish slimy discharge from bearing during last two months. A week ago udder filled and wax appeared on teats, and mare was a little uneasy, but udder has resumed normal. No movements of foal visible, and mare appears in good health.

Reply—The symptoms certainly point to the mare carrying a dead foal, and the difficulty may be that she is carrying two, one of which died some weeks ago and the other when the udder filled. Keep her bowels free on green feed and give 10 drops tr. pulsatilla morning and evening on tongue till something definite happens. If when she gets rid of what she is carrying the cleaning does not come away quickly, remove it in the way often directed in these replies and clean out the womb by inserting a sheet dipped in a solution of Condy (permanganate of potash). Should she become uneasy, examine her inside an hour or two after to see if help is required.

"T. B. B." Clarendon, seeks particulars in respect to treating a cow affected with milk fever.

Reply—The amount of air to be pumped into the udder should be sufficient to distend the organ as if it were overstocked, and while it is being pumped in the quarter should be well massaged. If the teats do not retain the air they should be tied with broad tape. As a rule the cow gets up as many hours after pumping as she has been down before. Sometimes a second injection is required. The cow should be propped on her breast and belly so as to get the pressure of her weight on the distended udder, which should not be milked out before injecting. She should be kept warm and comfortable.

"J. E." Clare, has a grey gelding affected with nasal gleet.

Reply—This is very obstinate to cure, and requires the operation of trephining in many cases. If the horse allows, syringe once a week with a wineglassful of a lotion made of loz. tr. hydrastis canadensis to a pint of water. Daily blow in a pinch of a powder made of one part sulphur and seven parts boracic acid, with a dash of snuff added.

"T. B. B." Clarendon, has a horse, 11 years, which when in harness rocks to and fro, looks over off shoulder, no appetite; symptoms recur every few days, and appear to be worse each time.

Reply—The symptoms point to abscesses in the stomach, possibly involving the liver too, and there is every probability that there will be an early opportunity for a post mortem. It is to be feared that treatment will not be of much avail, but improvement might follow the administration on the tongue every morning of 10 drops tincture nux vomica and a similar quantity of tincture arsenicum each evening for 10 days or so. An ounce of photographer's hypo in the drinking water once a day might also help.

"W. A." Wanbi, has a draught mare with a hard lump 2½ in. across on shoulder.

Reply—The lump is a hardened gland, and the only satisfactory way of getting rid of it is to cut it out. In her case as she cannot work with it, the cut should be ( ) down the front, the fingers should be passed all round

the lump, and a root will be found at the back; this must be cut as cleanly out as possible. The edges of the skin wound can be brought together with a couple of pins and horsehair across them, and the operation wound dressed daily with spirits of iodine (iod. resub. 1 dram, meth. spirit 1 pint). If this is done soon the flies will not annoy, and the mare should be fit by harvest.

"E. T. W.," Lameroo, reports lambs stiff in loins and legs.

Reply—The yellow daisies will not hurt if there is sufficiency of other feed, but if in excess they will upset the lambs. The treatment suggested should do good, but is it possible that your trouble is due to marking, in which case blood poisoning may produce the symptoms? Give each affected lamb a teaspoon of photographer's hypo in a little warm water once or twice a day.

"E. L. P.," Mindarie, had a bull, 12 months old, walking with head stretched out, then staggering, frothing at mouth, and distension of stomach; died.

Reply—Post mortem, some toadstools in stomach give the clue; they poisoned the beast. It was a wise precaution, however, to burn the carcasses as cause of death was uncertain. This should always be done when practicable, for it prevents the breeding of the maggot flies, which fatten on carrion lying about, and increase in thousands.

"C. J. D.," Harrogate, reports that sheep die almost suddenly, frothing at mouth, tongues black, skins very dark when dried, were seen eating young shoots of sugar-gum a few minutes before death.

Reply—Up to the present there is no direct evidence that sugar-gum shoots or leaves are poisonous, which, in fact, in ordinary circumstances they are not, but occasionally they may produce poisons like prussic acid—glucosides—in the paunch, and it would appear that such is the case here, but should other deaths occur it would be well to inform the Inspector of Stock, Tailm Bend, and he would investigate. There are records of similar suspicious cases in cattle. Treatment if in time—bleed at eye vein or leg vein or by thrusting knife through nose, and give sugar or molasses and warm milk as much as can be conveniently drenched, or if a pipe is handy, to pass down throat about a pint of the mixture.

"R. S.," White's Flat, seeks treatment for a horse with greasy heels.

Reply—The condition you describe is greasy heels, and it would be well to give internally twice a day for a fortnight one tablespoon of Fowler's solution of arsenic, which will be eaten in the feed. Externally apply twice a day some of the following lotion:—Sugar of lead 4oz., sulphate of zinc 4oz., water ½ pint, meth. spirit ½ pint. The condition is generally brought about by exposure to mud and wet.

#### TRAPPING EAGLEHAWKS.

The Hon. Secretary of the Goode Branch of the Agricultural Bureau, who has lately succeeded in trapping a number of eagles, describes the method he adopted in securing them, as follows:—Around the trunk of a tree, well out in the open, he erected a cage of wire netting sufficiently large to enable a couple of fowls to run, and outside the netting, at the bottom, three or four traps were placed. He found that the eagles saw the fowls, came down, struck the netting, and then proceeded to walk round the cage in an endeavor to get at the fowls, and were thus secured in the trap. If dingoes or foxes were in the neighborhood, for the protection of the fowls, it was well to put a netting floor to the cage.



## HEALTH AND DISEASE IN PLANTS.

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[The second of a course of three University Extension Lectures delivered at the University of Adelaide by Professor T. G. B. OSBORN, M.Sc. (Manch.)]

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In the opening lecture it was seen that a fungus disease of a plant is a phenomenon that involves two distinct organisms. In the first place there is to be considered the plant which is attacked, called the host, and secondly the fungus causing the disease, the parasite. Each of these organisms is a living structure, with its own particular life processes, and its own special requirements in the way of food, moisture, temperature, &c. In the case of wheat rust it has been noticed how a variation in the moisture present in the atmosphere, for instance, may play a very important part in determining the seriousness or otherwise of an outbreak in any season. There may be present on the plants in a field of wheat quite a considerable number of rust spots, but if the weather conditions are bright and dry the outbreak will be comparatively slight, and the fungus will do but little damage to the crop. On the other hand, if there be dull, muggy weather, and if the ears be just emerging from the leaves, then there is every probability that a serious outbreak will occur. It is obvious, then, that in considering plant disease we must bear in mind the needs of two organisms—it is not sufficient merely to consider the fungus.

### PLANT PATHOLOGY.

There has, until recently, been a great tendency for the study of plant disease to be little more than the study of the parasite. This is not a true *pathology*, but a *parasitology*—the main interest tending to centre around the disease-producing organism, and not the diseased plant. There has often been the feeling, and sometimes one finds it expressed in popular journals, that if only the fungus were identified all would be simple. This, of course, is not so. Valuable experimental work can be done upon a disease—work that may lead to some measure of control—without knowing the name of the organism producing the disease, or, in some cases, without even knowing if an organism be present at all. The case of animal diseases provides us with a familiar parallel. Because human life or that of domestic animals is so valuable, a considerable science of pathology was developed long before

Pasteur demonstrated that animal diseases were frequently caused by parasitic organisms. Even to-day the studies of the medical or veterinary student are studies of the organism attacked, and its behavior, rather than studies of the parasite.

#### HEALTH IN PLANTS.

In order, therefore, to successfully cope with plant disease, we must first clearly understand what happens in the normal condition of health. This is a comparatively new point of view so far as plants are concerned, though Professor Marshall Ward voiced it strongly as much as 20 years ago. It is only of recent years, and especially in the United States of America, that it has become generally recognised. We are now developing a new branch of botanical investigation, one that deals primarily with the plant attacked, and the special way in which it differs from the normal, and one which will lead to a clearer understanding of the diseases and to their more successful treatment. We must now briefly consider some of the normal life processes of a healthy, green plant.

#### GREEN PLANTS AND FOOD.

Plants, like animals, are living organisms, and as such require food. This is a truism, yet there is a certain amount of difficulty in understanding it, for the manner in which a normal green plant obtains its food is wholly different from that found in the case of animals. An animal ingests, or takes into itself, solid particles of food, which are then digested. A portion of the food goes to build up the body of the animal, but the bulk of it is simply broken down to supply the organism with the energy it uses in movement, &c. This use of food has been compared with the burning of fuel in order to supply an engine with the necessary power to run it. The simile is not a good one, and cannot be pressed far, but it may suffice for the present purpose. A green plant behaves quite differently. It ingests nothing. Everything enters it in solution, and even so the substances taken in are very different from the flesh or herbage eaten by an animal. These last are complex bodies, rich in stored energy the chemist tells us, a statement that one can explain by pointing out that they burn readily. The substances entering a plant are not of this type. In the first place there is absorbed by the roots from the soil, water and mineral salts in solution, such as potassium phosphate, nitrate, magnesium sulphate, &c. In order that this absorption may take place the soil must be sufficiently moist or the supply to the plant will be deficient. It must also be sufficiently aerated by good cultivation, and warm enough, for it is a matter of common observation that in cold weather plants make but

little growth. Within the plant the water and mineral salts are carried up the stems to the leaves. There a large proportion of the water is lost to the plant by evaporation, but some of it and the mineral salts are retained. But these substances are not food; to understand their use the leaves must be considered.

#### THE GREEN LEAF.

Those flattened, expanded surfaces of the plant that are termed leaves consist of a mass of cells, having a sponge-like structure, the

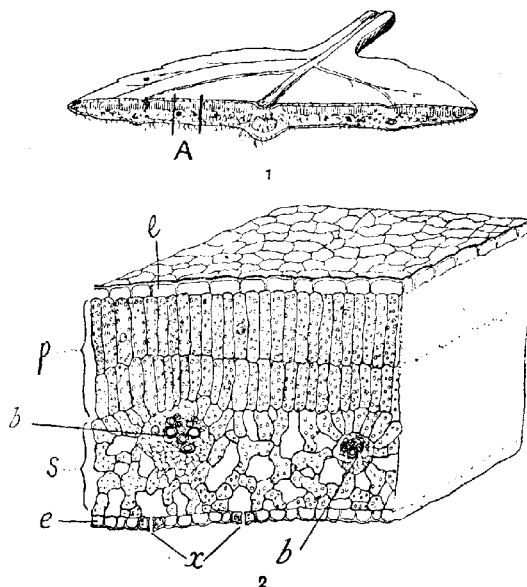


FIG. 1.—Leaf cut across. The portion A in 1 is seen highly magnified in 2. *x* are the pores or stomates by which the air enters the leaf, passing into the tissue (*s*). The green chloroplasts by which the starch is made are seen in the leaf cells, especially in the tissue (*p*).

(From Percival's *Agricultural Botany*.)

cells being separated by numerous air spaces. They are protected externally by a skin, and supplied with numerous veins connected with the conductive tissues of the stem. The air, which contains carbonic acid gas, passes through pores or stomates that are found chiefly on the lower surface of the leaves, into the air cavities within the leaf, and

there the carbonic acid gas enters the leaf cells. This it does by dissolving in the water present on the cell walls as the air passes along the passages in the sponge-like tissue of the leaf. In the leaf cells are numbers of little green bodies, called chloroplasts, which by means of the energy obtained from the sunlight turn the carbonic acid into such complex substances as sugar and starch. Further manufacturing processes go on in the plant, largely, it is thought, in the leaves, and the sugar, together with the mineral salts obtained by the roots, are built up into much more complex substances—proteins, &c. These, as well as the sugars and starch, form the true food of plants, just as they are the food of many animals. But it will be seen that a plant gains such food by a very different method from that used by an animal, for they are manufactured within the plant from much simpler bodies that in themselves have no food value. The leaves of the plant are especially concerned in the process—they may, in fact, be regarded as food factories. The raw materials used are the water and mineral salts from the soil and the carbonic acid gas from the air. To carry the comparison further, the machines concerned are chiefly the chloroplasts in the leaf cells, while the power is the energy obtained from the sunlight.

#### BREATHING.

There is another process in the life of a green plant that must be considered—it is respiration or breathing. In plants this process, just as vitally important for them as for animals, is not confined to special organs such as lungs, but takes place in all parts of the plant structure. Breathing is a decomposition process, in which the complex substances of the body break down and the waste products are removed, largely by the action of the oxygen gas of the air. An abundant supply of air is as needful for a plant's healthy existence as it is for an animal's. The green plant may be regarded as a machine, the efficient working of which depends upon, not only an adequate supply of raw material for making food, but upon a number of external conditions—temperature, humidity, and sunlight.

Suppose, now, a green plant is grown under dull, damp conditions, such as obtain during what we term muggy weather. Because the humidity of the atmosphere is increased, considerably less water will be given off into the air by evaporation from the leaf cells. The leaves, however, are receiving water all the time from the roots at approximately the same rate, because the conditions in the soil change more slowly than in the air. The result is the leaf cells become swollen with water, and the air spaces between them decreased in size. Less air thus reaches the interior of the leaf, consequently there is less oxygen available. The decomposition of the complex substances in-

volved in breathing goes on all the time, but since there is less oxygen to remove the degeneration products, they tend to accumulate in the living cells. These decomposition products are often of an acid nature, and their accumulation in the tissues reacts harmfully upon the protoplasm. A second effect is that the diminished sunlight affects the process of food manufacture, for the supply of power is cut down. Less food being made, the plant lives upon any that it may have stored within it; stored starch becomes changed into sugars. It may happen that a certain amount of growth is made, but it is not stout, thrifty growth, but feeble and sappy, and the whole plant contains an excess of watery, somewhat acid, sugary sap. The net result of the changed weather conditions is that the whole *tone* of the plant is lowered and its condition enfeebled. It reaches a state in which its power of resistance to disease is diminished.

#### THE PARASITE.

So much for the effect of such conditions upon the green plant—the possible host. Consider now, briefly, the fungus—the possible parasite. The fungus is a non-green plant; it cannot manufacture its own food, but absorbs it ready made. It has no need for sunlight as a source of energy or power. A diminished amount of light, so far from being injurious, is a positive advantage, for the most casual observation shows that fungi as a class are not light-seeking organisms. Similarly, the increased humidity of the atmosphere is beneficial to the fungus, which is a very delicate structure, offering little resistance to desiccation, and soon becoming dried up. Atmospheric conditions, then, which react harmfully upon the green plant and lower its vitality, may have a diametrically opposite effect upon the fungus that parasitises it. A change in the weather may often, as every grower knows, lead to the outbreak of an epidemic.

#### SPECIALISATION BY FUNGI.

From this, however, it must not be concluded that the atmospheric conditions *produce* the disease, they merely serve to render possible the rapid spread of a trouble which is already there. The spores of the parasitic fungus must be present, and, unfortunately, they are almost ubiquitous. The question naturally arises, why are not fungus diseases more common upon all plants? Why, for instance, do not all plants suffer from the fungus that causes wheat rust, the spores of which are produced in such countless millions? The spores of this fungus will germinate on the leaves of many plants if there be drops of water there, yet the germ tubes will only produce infection of their proper host. This condition suggests the existence of some unconscious attraction on the part of a host plant over its parasite. Experiments

have been made upon more than one occasion to determine what may cause this attraction. In the case of some fungi the mere presence of an unusual amount of sugar in the cells of the host appears to be sufficient; but in the case of most well-recognised parasites it appears to be something else, something peculiar to the particular plant attacked. What this something is we do not know. To solve the problem for even one fungus disease would be a great step in advance; but the problem is a difficult one, and calls for the aid of chemists as well as botanists.



FIG. 11.—Stem of "silver beet," showing the abnormality known as fasciation.

Often existing side by side with diseased plants there may be others of the same species quite free from attack. We say one is susceptible and the other immune. This is often strikingly shown by varieties of wheat under rust attack; but it may be observed in many other plants. Behind and beyond the mere conditions of food supply, of climate and of weather, there is something else to be considered, namely, the living plant itself. As Professor Marshall Ward has written, "If I were

asked to sum up the most important results of the numerous advances made during the past decade in agriculture and forestry, I should reply—The clearer and wider recognition of the fact that the plant itself is the centre of the subject, and not the soil, climate, season, or other factors of its environment."

#### TYPES OF PLANT DISEASE.

The manifestations of disease in plants are very varied; so also are the causes, so far as we know them at present. There are to-day many types of disease known, some of them of considerable economic importance, concerning the causes of which we know little or nothing.

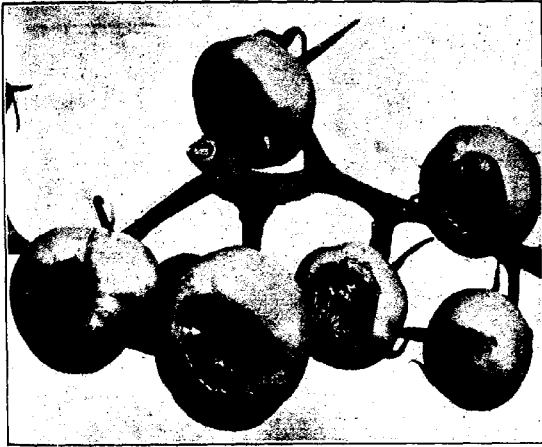


FIG. III.—Blossom-end rot of tomatoes. (From Brooks' *Phyto Pathology*, Vol. IV.)

The great group of plant abnormalities come in this class. Monstrous stems, of which that flattening known as fasciation is an example often to be found in many local gardens, "blindness" of flowers and the like are all due to causes not yet understood. Mal-nutrition, especially over-nutrition, no doubt plays a large part in producing them, but it is unlikely that it is the sole cause. Other maladies are much more like those that we know to be due to some type of parasitic organism, but as yet none has been identified in connection with them. Probably there are few growers who have not at some time or another been troubled by the tomato disease known as "blossom-

end rot." The depressed watery-looking area that appears around the remains of the style, and subsequently becomes brownish and leathery, is very familiar. Though in an advanced case of this disease fungi and bacteria may sometimes be present, yet no organism has been identified as the cause of the trouble. This is probably in South Australia our best known plant "disease of unknown origin," the type of disease that has often been miscalled "physiological"—an unhappy term, since all disease is due to physiological derangement. In other countries in which plant pathology has been longer studied several other such diseases of unknown origin exist, and are to be greatly feared, because of the loss they cause, *e.g.*, the "peach yellows" of California. Whether or not these are truly diseases of a

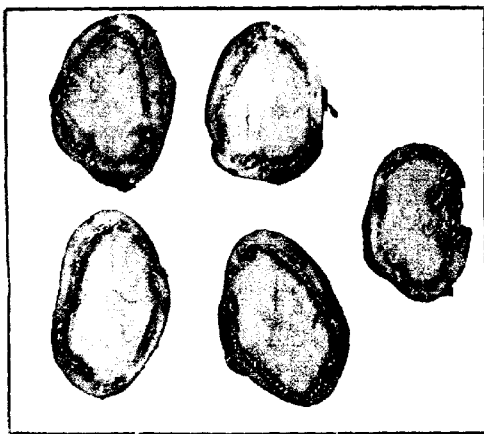


FIG. 14.—Bacterial rot of potatoes. The bacteria start the rot from the veins found a little distance below the skin of the tuber, thus producing a brownish ring in the flesh.

plant arising without any casual organism, only continued research can show. There are those who assert that ultimately all plant disease will be shown to be due to some pathogenic organism.

#### BACTERIAL DISEASE.

When we consider the history of bacterial diseases of plants this opinion has some justification. It is less than 40 years since the first bacterial disease of plants was described, and at that time and for many years afterward the correctness of the diagnosis met with much



adverse criticism. Now very many such diseases are known, but hitherto few have been found to be of much importance in Australia. A bacteriosis of potatoes, though, occurs in South Australia at times on a scale sufficiently large to cause noteworthy loss.

Other diseases of plants occur caused by plant and animal agency. We shall only deal with the former in these lectures. Though, strictly speaking, diseases caused by animal agency should be considered in any review of plant pathology, in practice they usually form a separate study—economic zoology—a field that in South Australia at present awaits a specialist.

#### FUNGUS DISEASES.

Of the plants causing disease of other plants, fungi are, in this State, far the most numerous. It must not be thought, however, that all parasitic fungi show the same degree of specialisation as is shown by the wheat rust fungus. In this case the fungus lives without destroying its host, though often doing serious damage to the yield of the crop. The injury to the infected plant may be considered as affecting it in at least two ways. There is, first, the obvious damage due to the drain upon the plant in having to support an organism living at its expense. But this loss through robbery is only one phase of the injury. A second is that the diseased areas of the plant are seriously impaired in their activity. Not only is growth made markedly less, but the affected areas are less efficient, if not wholly useless, as food-producing structures. This is the nature of the injury in some types of fungus disease. Often, however, the parasitic fungus gives the infected plant a much shorter shrift. Its action is so violent that a rapid destruction of the host takes place. If the fungus be a true parasite, that is, one only able to live upon a living plant, its own life and activity is limited by such rapid destruction of its source of food. We often find, however, that where a rapid destruction of the host takes place the fungus can continue to live for some time after, in a ghoulish fashion, upon the dead structure of its host. Such fungi are not strict parasites, but partially parasitic and partially saprophytic in their mode of living.

It is generally the case that during this saprophytic period of existence resting spores of the fungus are produced. The well-known fungus-producing scab of apples and pears (*Venturia pomii*) forms its perfect stage of spore production from the disease spots on the dead leaves during the winter. Similarly the "brown or ripe rot," caused by *Sclerotinia fructigena*, found not uncommonly upon peaches, pears, apples, &c., over-winters in the hardened, "mummified" fruit that has been destroyed, only to produce fresh spores next spring. The "take-

all" fungus, *Ophiobolus graminis*, does not produce its spores until some time after the death of the wheat plant attacked. Such cases show the necessity for burning all diseased portions of plants, instead of leaving them lying about.

Another point of interest is the differing behaviour of the same fungus upon different parts of the same plant. "Irish blight" of potatoes is produced by a fungus, *Phytophthora infestans*, that may



FIG. v.—Heads of oat infected with smut fungus,  
*Ustilago avenae*.

cause a rapid and most destructive rot of the potato tops. On the other hand, often the only noticeable effect is that the tubers show the disease in the form of the well-known rusty brown stains of the flesh. In the tuber the fungus may live for some months, and unless other fungi and bacteria attack it no rot may occur. It may not be until the tuber is planted as "seed" that the fungus grows out into the new shoots, and often produces the spores, which start a fresh attack.

## SMUT FUNGI.

The "smut" producing fungi are some of the most remarkable of those attacking plants because of the great specialisation of parasitism that they show. All agriculturists are familiar with the appearance of "smutted heads" of oats. On them, instead of grain, one finds little but a quantity of black powder enclosed at first by the outer chaff. This powder consists of the spores of the smut fungus, *Ustilago*

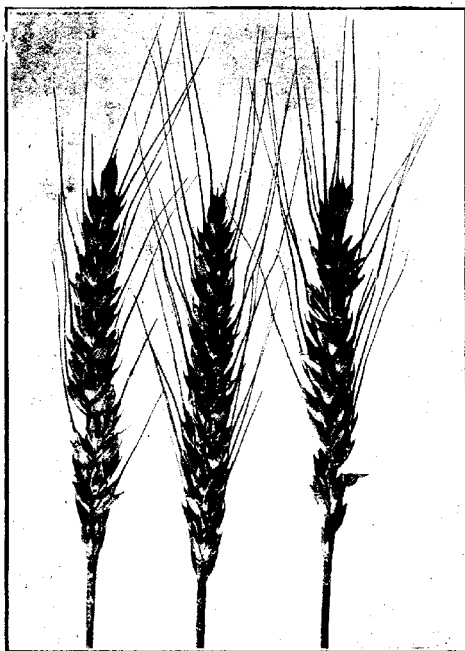


FIG. VI.—Bunt of wheat caused by *Tilletia tritici*. The smut spores remain as compact masses, "bunt balls" within the chaff, and are only freed when the head is broken up.

*avenae*. The spores are shed upon the ground and caught in the chaff of healthy grains. They can live dry for some time, but after a rest, when placed in water, they germinate. Upon germination each spore produces a number of conidia, which infect a germinating oat seed. The fungus grows in the tissues of the oat plant, producing little visible

effect until the flowers are forming. Then it thickly permeates the floral organs, destroying them and producing its own spores. The parasitic fungus here is so beautifully specialised in its parasitism that for months it lives upon its host without seriously impairing the latter's efficiency. After a time, at the period when the host would normally produce its seed and die, the fungus invades the host's pro-



FIG. VII.—Loose smut of wheat caused by *Ustilago tritici*. In the examples on the left the whole of the chaff has been destroyed as well as the grain.

ductive organs, benefits by the food material accumulating there, and forms its own spores in place of its host's seed. The story of "bunt," *Tilletia tritici*, is essentially the same; here, however, the spores form in compacted masses, and are not shed in the form of powder. In the case of flag-smut of wheat, *Urocystis tritici*, essentially the same series of events happens, but the spores are produced upon the leaves.

so the host is generally destroyed before the ears are produced. The story of the loose smut of wheat, *Ustilago tritici*, is even more remarkable. Here, again, similar loose masses of blackish spores are formed in place of the grain. Sometimes the whole of the chaff may be destroyed, and the main stalk of an ear alone be left. The loose, powdery spores, however, are shed at the time when the uninfected wheat flowers will be putting out their feathery stigmas to catch the pollen. Some of the smut spores are caught in the stigmas, too, and germinate there. The tube that is put out by the spore grows to the ovary, which it infects. The presence of the fungus, however, does not prevent the grain from setting. Seed is formed, but it is infected seed, and with the young plant next season there grows up the fungus, which, in its turn, forms spores in place of grain. It will be seen that the story is somewhat similar to that of loose smut of oats, but with this difference, the infection takes place at the flowering stage, and the grain produced is already diseased, though it is viable. It is, surely, but a stage further than this in specialisation for the fungus to cease forming spores at all, for it to grow out of the infected seed, live at the expense of its host, then infect the next generation of the host when seeds are formed, and so on. Such extreme cases of perfect parasitism (from the fungus' point of view, if the expression may be allowed) do actually exist. It is questionable, though, whether in such cases the fungus can be considered as producing a disease of its host. The life processes of the two organisms are so balanced that the one can exist without noticeable detriment to the other. Very many examples are known of fungi living in the tissues of higher plants, but producing no disease. The region infested is usually the roots, *e.g.*, many forest trees, orchids, &c., and in these cases the presence of the fungus is a positive advantage to the flowering plant, which in many cases cannot be grown without its partner. But clearly such associations can hardly be considered as pathological.

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#### SPRAYING FOR CODLIN MOTH.

"The best spray for suppressing codlin moth is arsenate of lead blended at the rate of 1lb. of the paste to 20galls. to 25galls. of soft water, or 40galls. to 50galls. of water to each pound of the powdered form," said the Horticultural Instructor (Mr. G. Quinn), in reply to a correspondent. "The first spraying in each season is applied just after the blossoms fall, a second about 14 days later, and a third a month or six weeks after the second. For late-ripening apples in a badly infected place another spraying is desirable about the end of January."

## CONTAGIOUS ABORTION IN MARES.

Attention has recently been directed to a statement that settlers in the Victorian mallee were suffering loss through the appearance of contagious abortion in mares. It will be remembered that the South Australian Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) uttered a warning some few weeks ago at Pinnaroo that it was to be feared the trouble might be found in the district; at the same time he pointed out that there was no cause for a scare if farmers would take commonsense precautions when mares slipped foal. The cause of the trouble, Mr. Place explained, is a bacillus, which, like that which produces lockjaw, is very prevalent in almost all districts, but only becomes active for harm under certain climatic and atmospheric conditions which, unfortunately, are those which have been prevailing lately.

The symptoms are those which occur in any case of slipping foal, but in many cases of the contagious disease there is a bloodstained glairy discharge preceding the abortion, possibly not profuse enough to call for much comment, but noticeable when looked for.

The casting of the foal at the seventh or ninth month, and often earlier, is not accompanied by much difficulty on the part of the mare, and in the majority of cases she does not suffer from bad after effects, though the older the foal is the more likely she is to fall off in condition after the occurrence.

As the foal is slipped before the farmer is aware that anything is going to happen, treatment is of little use; but in those cases where the udder springs, and there is swelling under the belly, a dose of a teaspoonful of saltpetre twice a day is advisable for a week, and, for those who prefer it, 10 drops of tr. pulsatilla on the tongue twice a day for a like period.

### PREVENTION.

Prevention is based on the fact that the disease has a definite bacterial cause, and in some countries a preventive vaccine is prepared and used, but in South Australia the scarcity of qualified veterinary surgeons able to apply this practically puts it out of court, for it is not a safe remedy for the amateur to play with.

The ordinary commonsense treatment of in-foal mares, the avoidance of hard mallee scrub feed, must be observed, and when a mare is suspected of being about to abort, strict isolation must be carried out, and the foal and all discharges must be deeply buried *after being disinfected* with kerosene or other efficient material. Where it is possible, destruction by fire is by far the best.

Other in-foal mares must be kept out of the paddock or yard where the occurrence has happened, for, like cows, they are very curious to

investigate the affair, and so become infected themselves, both by means of the nostrils and mouth.

As the after-discharges from the mare remain infective for a considerable time, it is necessary to disinfect the passage, the bearing, and the thighs and tail, and this should be done daily for three days, then once a week for twice more.

The best way of doing this is to make a solution of perchloride of mercury of the strength of 1-1250, and this is conveniently done by dissolving a Burroughs, Wellcome tabloid in a pint of warm water in an enamel or earthenware vessel (not metal), and swabbing the parts with it; if a syringe is used it must not be metal.

The hands should be thoroughly cleansed before touching other mares, and carelessness in leaving discharges or infective material about must be sternly rebuked.

The mare that has aborted should not be put to the stallion until she has been thoroughly disinfected, and it is as well to disinfect her internally as well as locally. This may be done by giving her an ounce or two of hyposulphite of soda daily for a week, or if she will take it in her food, as many will, a dram of pure carbolic acid in a teacup of water once a day for a week.

It must be remembered that a mare may carry a foal to full time, although at the same time a carrier of the germs which may prove abortive to others, so that she may prove a source of danger, and should be carefully watched and disinfected if she shows signs of any discharge.

The majority of infected mares also show granular roughenings on the mucous lining of the passage, and should this be observed they, too, should be treated.

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## SEED IMPORTED FROM ABROAD INTO SOUTH AUSTRALIA.

RESULTS OF PURITY TESTS DURING THE YEAR ENDED  
JUNE 30TH, 1916.

[By H. W. ANDREW, Botanical Assistant and Quarantine Officer  
for Plants, South Australia.]

Eighty years ago, on the foundation of the Colony of South Australia, the number of agricultural and garden weeds could have been counted on the fingers of both hands. Among these should be included

the native weeds *Acaena sanguisorba*, Vahl. (burr weed), *Acaena ovina*, Cunn. (sheep's burr), the burrs of which are so troublesome to picknickers to the Mount Lofty Ranges in the summer months, and one or two kinds of *Loranthus* (mistletoes), whose sticky berries are still occasionally transferred by birds to the fruit trees of the fig, mulberry, etc., where they germinate and grow into parasitic plants. Since that time over 400 introduced plants have established themselves more or less in this State (described in the "Naturalised Flora of South Australia," or recorded in the transactions of the Royal Society of South Australia, by Mr. J. M. Black). Owing to their obtrusive and importunate character the majority of these plants may be rightly stamped as weeds. There is no doubt whatever that the chief medium through which new weed pests have been introduced into various countries is by way of agricultural and other seed. The principal objects of the following notes are, firstly, to demonstrate the frequency and nature of the occurrence of weed seeds in 396 separate lots of seeds from abroad; secondly, to endeavor to show the farmer, gardener, and seedsman the importance before ordering of always stipulating for pure seed, and carefully examining all seeds before planting; this examination should be done preferably by someone accustomed to such work, who has the necessary experience and equipment (pocket lens, specimen weed seeds, &c.); thirdly, to draw attention generally to the need for the systematic examination of bird and other seed not necessarily required for sowing purposes.

#### FREQUENCY OF OCCURRENCE OF WEED SEEDS.

Table I. sets forth in detail the botanical and common name of 25 kinds of weed pests proclaimed under the Federal Quarantine Act, and about 40 other weeds, &c., found in certain of 396 lots of seed imported from extra-Australian sources and examined for weed seed and other impurities during the year under review.

The kind of seed and number of consignments (or samples) in which the respective weed or foreign seeds were found are also shown alongside the total number of the respective kinds of seed consignments actually examined during the year. Thus, to illustrate by example, on turning to the first part of Table I., devoted to the occurrence of "noxious weeds," it will be found that seeds of *Brassica Sinapisstrum* (charlock or wild mustard) were found in one consignment of wheat out of three examined, in one lot of cultivated oat out of eight, in 14 lots of earlary seed out of 16, and in four lots of linseed out of five. From this it may therefore be seen that in the case of charlock seeds occurred in 20 consignments of imported seed, and so on.



#### OBJECTS OF PROCLAIMING "WEED PESTS" UNDER FEDERAL QUARANTINE ACT.

In any consideration of the work being conducted along these lines it must be realised at the outset that the main purpose of proclaiming certain plants under the Federal Quarantine Act to be "weed pests," is to absolutely prohibit the introduction into any State of any noxious weed new to the country, and further to restrict the importation of others in consignments of seed from abroad. Consequently the significance to be attached to the presence of the different kinds of weed pests varies considerably, chiefly according to the fact whether the weed is already established in the country or not. In all cases, however, even in the case of less pernicious weeds like goosefoot or fat hen, these seeds mixed with seeds intended for sowing by the farmer and the gardener constitute not only a varying percentage of foreign material for which they pay at the same rate as for the pure seed, but add insult to injury in that the planter is befooled in sowing what he may consider to be the correct proportion of pure seed, and moreover, continue perhaps for years to make big inroads upon his time and purse in suppressing them.

In this connection it may be appropriately pointed out that whatever the virtues of a weed, for instance, such as *Chenopodium album* (goosefoot) may be under certain circumstances, it will scarcely be argued that 17,648 seeds per lb. (approximately) of this plant (apart from other weeds) in a consignment of 14lbs. of Early Horn carrot received here in February last should have been admitted without being cleaned or destroyed (see Table II.), such plants among crops, surely will find no apologist.

#### IMPURITIES UNDER THE FEDERAL COMMERCE ACT.

For dealing with other weed seeds, dirt, and foreign matter not proclaimed under the Federal Quarantine Act which sometimes occur in large quantities in seed importations, ample powers are given under the Federal Commerce Act to allow such impurities to be freed from consignments where practicable, or otherwise treated. This Act provides that all seeds imported from countries outside Australia shall be (a) true to name, (b) sound, (c) clean, and (d) new. The first three conditions are tested at this office when examining samples under the Quarantine Act for noxious weeds.

#### FALSE DESCRIPTION OF CONSIGNMENTS OF SEED.

Concerning section (a) genuineness of seed (correct trade description) one consignment of seed described as Sheep's Burnet (*Poterium Sanguisorba*) after close examination revealed that nearly one quarter of the consignment by weight was made up of sainfoin (*Onobrychis*

*sativa*). These two "seeds" are much the same color and size, and on a casual examination look much alike, and the plants themselves are very similar in vegetative characters, the leaves of both being pinnate, though the burnet has serrate margins, so that when growing together it is not every farmer who would recognise the fact he had two separate plants, burnet belonging to the rose family and sainfoin to the pea family.

#### INSECT AND DISEASE-INFESTED SEED.

Section (b). This involves the testing of seeds in relation to freedom from insects and disease, and examinations revealed the presence of dead weevils (*Bruchus* sp.) in a consignment of Egyptian clover, and live bread and biscuit beetles (*Anobium panicum*) in 12 bags of coriander seeds, also various mites, chiefly found in Brassica seeds. *Ustilago avenae* (Pers.) Jens, and *U. hordei* were found in oats and barley respectively.

Work under section (c), including the testing of consignments for seeds other than those mentioned in the Trades Description, is detailed in the latter part of Table I., and also included in Tables II. and III.

#### GERMINATION TESTS.

Section (d), which covers a considerable amount of work in testing the newness or vitality of seeds intended for sowing, is not dealt with in these notes.

#### BIRD SEED AND WEED DISSEMINATION.

An outstanding feature of this branch of the year's work is the surprisingly large number of weed seeds found in bird and other seed not necessarily imported for sowing purposes. Reference to Tables I. and II. will show the occurrence of these in canary seed, linseed, &c., in 16 and five consignments respectively examined systematically since last November (not the whole year). These particulars should be of interest to the consumer, as well as the primary producer, as tending to show the effect of bringing into operation the clauses of the Commerce Act, providing for the restriction of food adulteration, etc.

Apart from foreign seeds it was found that three consignments of linseed aggregating 98 bags, chiefly from Japan; and 58 bags of canary seed from Morocco, contained large quantities of dirt and other refuse (see Table II.).

That bird seed may be a fertile source of distributing weeds may be reasonably expected. Complete and painstaking experiments have been conducted in various parts of the world which have demonstrated in some cases that the germination of certain seeds is even accelerated by passing through the digestive tracts of animals.

It is recognised by naturalists generally that birds in this way are great distributors of plants. There can be little doubt that bird droppings are largely responsible for the frequent clumps of *Lycium canpanulatum* (African boxthorn) under eucalyptus and other trees in the plains of Adelaide and elsewhere. Possibly the nutlets or "seeds" of "Patterson's curse" and the small, round, partial pods of the turnip weed containing a single seed (as found in lots of commercial seeds) are not even swallowed by canaries and other small birds, but simply discarded. In any case, whether eaten or not, many uninjured weed seeds, judging by their repeated occurrence in lots of canary seed, &c., ranging in quantity up to 174 bags, must be thrown out with the refuse from cages, &c., and so providing fresh centres of weed distribution. In particular canary seed from Morocco revealed the presence of seeds of Patterson's curse or Salvation Jane in three consignments, charlock in 14, turnip weed nine out of 16 consignments examined.

There appears to be a prevailing impression throughout Australia that *Echium plantagineum* (including *E. violaceum*) has possibly spread generally as a result of this plant escaping from the garden of a Mr. Patterson, near Albury, New South Wales. There is no doubt this and other pests have become distributed over wide areas in this way, but in view of the frequency of the occurrence of Patterson's curse in lots of canary and agricultural seed ranging up to 174 bags in the consignment, it can hardly be doubted that this plant and a large number of others have been disseminated mainly by way of impure lots of seed.

#### MEDITERRANEAN WEEDS.

A large number of our naturalised plants originated from the Mediterranean region, chiefly European and North African coasts (over 90 in South Australia), and in respect to this well-known fact, attention is drawn to the occurrence of "seeds" of *Rapistrum rugosum* (turnip weed), a proclaimed weed of Italy, and which has occasioned so much trouble in certain farming districts here, among seeds of *Poterium Sanguisorba* (sheep's burnet) from France, and in nine consignments of canary seed from Morocco.

#### COMMONWEALTH GRADING MACHINE.

Prior to February, 1916, dirty consignments of seed, when practicable, were sent to various firms to be cleaned by grading machines, but for various reasons, including the better supervision of the seed so placed under bond, the Commonwealth Quarantine Department, at the instance of the Chief Quarantine Officer for Plants, S.A. (Mr. George Quinn), authorised the purchase of a seed grader, and goods are now treated for the actual cost of the labor, &c., involved, in the Quarantine Fumigation Depot, at Port Adelaide.

TABLE I.

BOTANICAL NAME.	COMMON NAME.	NAME OF IMPORTED SEED in which Weed Seeds were found.		No. of Samples in which Weed Seeds were found.	No. of Samples Examined.
		Botanical Name.	Common Name.		
<i>Agrostemma Githago</i> , L. ( <i>Lych- nis Githago</i> )	Purple Corn Cockle	<i>Polygonum Sanguinaria</i> , L.	Sheep's Burnet	1	1
<i>Anarratus</i> sp.	—	<i>Linum usitatissimum</i> , L.	Linseed	2	5
<i>Anthemis Cotula</i> , L.	Stinking Mayweed	<i>Andropogon Sorghum</i> , Brot.	Sudan Grass	1	1
		<i>Eragrostis ciliaris</i> , Link.	Red Grass	1	1
		<i>Avena sativa</i> , L.	Cultivated Oat	1	8
		<i>Linum usitatissimum</i> , L.	Linseed	2	5
<i>Avena fatua</i> , L.	Wild Oat	<i>Triticum sativum</i> , Lam.	Wheat	2	3
		( <i>T. vulgare</i> , L.)			
		<i>Avena sativa</i> , L.	Cultivated Oat	2	8
<i>Brassica Sinapisstrum</i> , L.	Charlock, Wild Mustard	<i>Triticum sativum</i> , Lam.	Wheat	1	3
		<i>Avena sativa</i> , L.	Cultivated Oat	14	16
		<i>Phalaris canariensis</i> , L.	Canary Grass	4	5
		<i>Linum usitatissimum</i> , L.	Linseed	3	16
		<i>Phalaris canariensis</i> , L.	Canary Grass	1	8
		<i>Avena sativa</i> , L.	Cultivated Oat	1	5
<i>Centaurea</i> sp.	Thistle sp.	<i>Linum usitatissimum</i> , L.	Linseed	1	3
		<i>Medicago sativa</i> , L.	Lucerne	1	11
		<i>Milium Cereale</i> , L.	Onion	6	16
		<i>Phalaris canariensis</i> , L.	Canary Grass	1	5
<i>Centaurea melitensis</i> , L.	Cockspar (Mullese)	<i>Linum usitatissimum</i> , L.	Linseed	1	2
<i>Cerastium vulgatum</i> , L. (C. <i>glomeratum</i> )	Beard-leaved Mouse-ear Chickweed	<i>Poa trivialis</i> , L.	Rough Stalked Meadow Gr.	1	5
<i>Chenopodium album</i> , L.	Goosefoot, Fat Hen	<i>Poa pratensis</i> , L.	Kentucky Blue Grass	1	3
		<i>Pedunculus sativum</i> , Hfm.	Parley	1	8
		<i>Avena sativa</i> , L.	Cultivated Oat	4	12
		<i>Daucus Carota</i> , L.	Carrot	1	1
		<i>Horradum sativum</i> , L.	Barley	4	1
		<i>Lepidium sativum</i> , L.	Cress	1	2
		<i>Triticum sativum</i> , Lam.	Wheat	2	4
		<i>Sinapis alba</i> , L.	White Mustard	1	4
		<i>Brassica Rapa</i> , L. (Kraut)	Black Mustard	1	22
				1	2

<i>Leguminosae</i>	<i>Verbe-</i>	<i>Black Dodder</i>	<i>Linseed</i>	1	5
<i>Leucaena glauca</i> , L.	.....	.....	Sulla	1	1
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Cow Grass	1	1
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	3	16
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Radish	1	10
<i>Leucaena plantaginifolia</i> , L.	.....	.....	White Mustard	9	23
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	1	4
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Tare	2	16
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Spinach	2	5
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Red Beet	5	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Rape	3	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Sweet Turnip	1	10
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Sheep's Turnip	1	1
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Linseed	3	5
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Black Mustard	1	2
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	1	16
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Japanese Millet	3	3
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Radish	1	25
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Linseed	3	5
<i>Leucaena plantaginifolia</i> , L.	.....	.....	White Mustard	1	4
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Spinach	1	5
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	2	2
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Red Beet	12	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Radish	1	25
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	2	16
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Lucerne	1	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Red Beet	2	3
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Spinach	4	5
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Rape	1	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	White Mustard	2	4
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	1	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Radish	1	3
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Linseed	3	25
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Radish	1	10
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Mangel	3	3
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Wheat	1	12
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Red Beet	8	3
<i>Leucaena plantaginifolia</i> , L.	.....	.....	Canary Grass	3	16

TABLE I.—continued.

TABLE I.—continued.						
NOXIOUS WEEDS (Under Federal Quarantine Act).		NAME OF IMPORTED SEED in which Weed Seeds were found.			No. of Samples in which Weed Seeds were found.	No. of Samples Examined.
Botanical Name.	Common Name.	Botanical Name.	Common Name.			
<i>Rumex</i> sp.	Dock	<i>Poa pratensis</i> , L.	Kentucky Blue Grass	2	5	
		<i>Phalaris canariensis</i> , L.	Canary Grass	7	16	
		<i>Avena sativa</i> , L.	Barley	1	12	
<i>Rumex acetosella</i> , L.	Sorrel Weed (Sheep Sorrel)	Cultivated Oat		1	5	
		Kentucky Blue Grass		1	3	
		Fescue Grass		3	3	
		<i>Poa annua</i> sp.	Alsike Clover	1	2	
		<i>Trifolium hybridum</i> , L.	Clover	1	4	
		<i>Trifolium</i> sp.		1	1	
<i>Rumex crispus</i> , L.	Curl'd Dock	<i>Brassica oleracea</i> , L.	Kale	4	5	
		<i>Poa pratensis</i> , L.	Kentucky Blue Grass	1	5	
		<i>Linnam usitatissimum</i> , L.	Linseed	5	16	
		<i>Phalaris canariensis</i> , L.	Canary Grass	7	16	
		<i>Phalaris arvensis</i> , L.	Barnum	1	1	
		<i>Trifolium arvense</i> , L.	Japanese Clover	2	16	
		<i>Lepidocladus striata</i> , Rostk. & Schmidt	Linseed	1	3	
		<i>Linnam usitatissimum</i> , L.	Wheat	2	12	
<i>Sida</i> sp.	Bladder or Cow Sospwort (Nancy)	<i>Phalaris arvensis</i> , L.	Rape	9	15	
<i>Scoroparia Vaccaria</i> , L.	Catchfly	<i>Phalaris arvensis</i> , L.	Linseed	2	3	
( <i>Vaccaria sepialis</i> )		<i>Phalaris canariensis</i> , L.	Canary Grass	3	16	
<i>Silene</i> sp.		<i>Linnam usitatissimum</i> , L.	Cress	2	2	
		<i>Linnam usitatissimum</i> , L.	Yorkshire Fog	2	2	
		<i>Holcus lanatus</i> , L.	Yarrow	1	1	
		<i>Medicago lupulina</i> , L.	Alsike Clover	1	1	
		<i>Trifolium hybridum</i> , L.	Linseed	1	6	
		<i>Linnam usitatissimum</i> , L.		—	—	
		<i>Linnam usitatissimum</i> , L.	Linseed	3	5	
		<i>Avena sativa</i> , L.	Cultivated Oat	1	8	
		<i>Linnam usitatissimum</i> , L.	Linseed	2	2	
		<i>Holcus lanatus</i> , L.	Yarrow	1	2	
		<i>Holcus lanatus</i> , L.	Yarrow	1	1	
		<i>Stellaria media</i> (L.) Vill.		1	1	
<i>Sinapis arvensis</i> , L. (see <i>Brassica Sinapisstrum</i> )	Charlock (Wild Mustard)					
<i>Sinapis arvensis</i> , L.	Corn Spurry					
<i>Sinapis arvensis</i> , L.	Chickweed					

Botanical Name.	Common Name.	Name of Imported Seed in which Weed Seeds were found.	No. of Samples in which Foreign Seeds were found.	No. of Samples Examined.
<i>Ambrosia</i> sp.	Ragweed sp.	<i>Lespedeza atrata</i> , Hook & Arn.	1	1
<i>Ambrosia artemisiifolia</i> , DC.	Ragweed	<i>Panicum Crispigalli</i> , L.	1	3
<i>Anagallis arvensis</i> , L.	Pimpernel	<i>Hieracium</i> . . . . .	1	3
	Sweet Vernal Grass.	<i>Drosera Rotunda</i> , L.	1	12
<i>Buzoparandrum odoratum</i> , L.		<i>Aridanthellum elatius</i> (L.) Beauv.	1	1
<i>Bupleurum</i> sp.	Chicory	<i>Phalaris canariensis</i> , L.	3	16
<i>Cichorium intybus</i> , L.		<i>Triticolum sp.</i> . . . . .	2	2
		<i>Triticolum pratense</i> , L.	1	1
		<i>Triticolum alexandrinum</i> , L.	1	1
<i>Crepis capillaris</i> , Wallr.	Hawkweed	<i>Medicago sativa</i> , L.	1	3
		<i>Achillea Millefolium</i> , L.	2	2
<i>Fragopyrum</i> sp.	Buckwheat	<i>Gnaphalium sativum</i> , L.	3	9
		<i>Panicum spp.</i> . . . . .	2	1
<i>Geranium dissectum</i> , L.	Cranshill	<i>Medicago lupulina</i> , L.	1	22
<i>Hyperbaris radicata</i> , L.	Rooted Cat's Ear	<i>Brassica Rapa</i> , L.	3	3
<i>Lolium rigidum</i> , Gaud?		<i>Festuca spp.</i> . . . . .	3	3
		<i>Dactylis glomerata</i> , L.	4	5
<i>Lolium temulentum</i> , L.	Darnel, Drake	<i>Lolium unistatissimum</i> , L.	3	16
		<i>Pedicularis canadensis</i> , L.	15	16
		<i>Lilium tigrinum</i> . . . . .	2	12
		<i>Brassica Napus</i> , L.	1	3
<i>Lycchnis</i> sp.	White Cockle (?)	<i>Medicago sativa</i> , L.	1	3
		<i>Poa pratensis</i> , L.	1	3
<i>Marrubium inodora</i> , L.	Mayweed	<i>Medicago lupulina</i> , L.	1	1
<i>Medicago discolorata</i> , Willd.	Toothed Medic.	<i>Poa trivialis</i> , L.	1	2
<i>M. discolorata</i> (M. discolor)	Burr Clover	<i>Beta vulgaris</i> , L.	1	12
<i>Medicago lupulina</i> , L.	Black Medic	<i>Daucus Carota</i> , L.	1	12
		<i>Brassica Napus</i> , L.	1	1
<i>Necta paniculata</i> (L.), Desv.	Ball Mustard	<i>Brassica napus</i> , L.	1	1
<i>Oxytropis sativa</i> , Lam. (O. <i>viciales</i> )	Sainfoin	<i>Lilium sativum</i> . . . . .	1	1
		<i>Potentilla Sauguerba</i> , L.	1	1

TABLE I. - *continued.*

[illegible]



TABLE II.—Particulars of Consignments of Imported Seed Cleaned or Destroyed on Account of Presence of Impurities under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916).

Sample No.	Description of Seed Imported.	Quantity	Kind of Weed and Other Seeds Contained.	No. per Oz.	Approximate No. per Pound.	Weed Seeds and Rubbish After Clearing.
	<i>Andropogon Sorghum</i> (Sudan Grass) From U.S.A.	7lbs.	<i>Amarantus retroflexus</i> (Pigweed, Redroot)	43	688	Lbs. —
	<i>Lespedeza striata*</i> (Japanese Clover) From U.S.A.	7lbs.	<i>Ambrosia</i> sp. (Ragweed sp.) . . . . . <i>Setaria</i> sp. . . . . <i>Sida</i> sp. . . . . Unknown sp. . . . .	815 24 2 9	13,040 384 32 144	— — — —
					13,600	
	<i>Panicum Crus-galli*</i> (Japanese Millet) From U.S.A.	500lbs.	<i>Ambrosia artemisiifolia</i> (Ragweed) . . . . . <i>Setaria glauca</i> (Yellow Foxtail) . . . . . <i>Polygonum Persicaria</i> (?) . . . . . <i>Polygonum</i> sp. . . . . Unknown sp. . . . .	276 772 48 9 4	4,416 12,352 768 144 64	— — — — —
					17,744	
	<i>Linum usitatissimum</i> (Linseed) From Japan	70 bags	<i>Polygonum Convolvulus</i> (Black Bindweed) . . . . . <i>Stellaria media</i> (Chickweed) . . . . . <i>Lolium (rigidum?)</i> . . . . . <i>Spergula arvensis</i> (Corn Spurry) . . . . . <i>Galium</i> sp. (Cleavers) . . . . . Others . . . . .	52 21 30 4 8 8	832 336 480 64 128 128	500 — — — — —
					1,968	
	Linseed From Japan	15 bags	<i>Brassica Sinapistrum</i> (Charlock) . . . . . <i>Anthemis Cotula</i> (Stinking Mayweed) . . . . . <i>Lolium temulentum</i> (Darnel, Drake) . . . . . <i>L. rigidum</i> (?) . . . . . <i>Setaria viridis</i> (Green Foxtail) . . . . . <i>Xestia paniculata</i> (Ball Mustard) . . . . . <i>Rumex</i> sp. (Dock) . . . . . <i>Chenopodium album</i> (Fat Hen) . . . . . Others . . . . .	218 49 5 200 9 8 8 5 5	3,488 784 80 3,200 144 128 128 80 80	300 — — — — — — — —
					8,112	
	<i>Daucus Carota</i> (Early Horn Carrot) From New Zealand	14lbs.	<i>Chenopodium album</i> . . . . . <i>Polygonum Convolvulus</i> . . . . . <i>Rumex</i> sp. (Dock) . . . . . Others . . . . .	1,103 19 12 3	17,648 304 192 48	3½ — — —
					18,192	

TABLE II.—Particulars of Consignments of Imported Seed Cleaned or Destroyed on Account of Presence of Impurities under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916).

Sample No.	Description of Seed Imported.	Quantity	Kind of Weed and Other Seeds Contained.	No. per Oz.	Approximate No. per Pound.	Wt. in Seals
356	<i>Beta vulgaris</i> (Johnson's Dark-leaved Red Beet) From England	112lbs.	<i>Convolvulus arvensis</i> (Lesser Bindweed) <i>Polygonum Convolvulus</i> .....	20 6	320 96	
					416	
370	<i>Brassica Rapa</i> (White Stone Turnip) From England	--	<i>Stellaria media</i> (Chickweed). <i>Chenopodium album</i> .....	291 2	4,656 32	
					4,688	
434A	<i>Linum usitatissimum</i> (Linseed) From Argentine	13 bags	<i>Silene gallica</i> (French Catchfly) <i>Lolium temulentum</i> .....	200 10	3,200 160	
			<i>Agrostemma Githago</i> .....	4	64	
			<i>Rumex</i> sp. (Dock) .....	6	96	
			<i>Lolium</i> sp. ....	400	6,400	
					9,920	
441	<i>Phalaris canariensis</i> (Canary Grass) From Morocco	58 bags	<i>Lolium temulentum</i> .....	112	1,792	1
			<i>L. rigidum</i> (?) .....	50	800	
			<i>Rumex</i> sp. ....	4	64	
			<i>Brassica Sinapistrum</i> .....	5	80	
			<i>Silene</i> sp. ....	2	32	
			<i>Triticum sativum</i> .....	48	768	
			Others .....	15	240	
					3,776	
484	<i>Lepidium sativum</i> , L. (Curled Cress) From England	224lbs.	<i>Stellaria media</i> .....	78	1,248	
			<i>Chenopodium album</i> .....	23	368	
			<i>Polygonum Persicaria</i> .....	4	64	
			<i>Silene</i> sp. ....	3	48	
					1,728	

\* Consignments destroyed on account of the large number of foreign seeds contained, including two species of *Ambrosia*, which hitherto, apparently, have not established themselves in South Africa.

TABLE III.—Table Showing the Frequency of Occurrence of Noxious and Other Weed Seeds in Consignments of Seed Examined under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916).

Noxious and Other Weed Seeds Found in Three or More Samples.	No. of Samples.
Black Bindweed .....	31
Catchfly .....	12
Charlock .....	20
Chickweed .....	9
Chicory .....	4

TABLE III.—*Table Showing the Frequency of Occurrence of Noxious and Other Weed Seeds in Consignments of Seed Examined under the Federal Quarantine and Commerce Acts (Year ended June 30th, 1916)—continued.*

Noxious and Other Weed Seeds Found in Three or More Samples.	No. of Samples.
Cockspur and Thistle sp. ....	14
Corn Spurry ....	4
Dandel or Drake ....	17
Goosefoot, Fat Hen ....	16
Green Foxtail ....	8
Hawkweed ....	3
Knotweed, Hogweed, or Wireweed ....	8
Lesser Bindweed ....	8
<i>Polygonum</i> sp. ....	13
Rib Grass ....	8
Rooted Cat's Ear ....	4
Sheep Sorrel ....	6
Turnip-weed ....	12
White Cockle ....	3
Yellow Foxtail ....	4

## GRAFTING WAX.

Replying to a correspondent, who sought information relating to the manufacture of grafting wax, Mr. Quinn gave the formula he always used, as follows:—Four parts by weight resin (powdered), 1½ parts by weight beef or mutton tallow (not salted), 2 parts by weight beeswax. The tallow and beeswax should be placed in a vessel and dissolved over a fire, and the powdered resin then slowly stirred in. This should be boiled for about 20 minutes, until all is dissolved. Then pour the molten wax into a bucket of clean water, and after greasing the hands well, lift it out and knead it down to a fine even grain. If wrapped in damp-proof paper it will keep for years. This wax will become plastic by placing it by the fire for a few minutes or in the sun for an hour or two. It will work then with the warmth from the hands. To remove it from the hands use oil or grease before soap and water, as nothing else will shift it. If waxed cloth is needed for small stocks, roll strips of cheap calico torn to a couple of inches in width around the end of a stick—perforated bamboo for preference—and hold it for five minutes in the boiling wax to become impregnated through, taking care not to rest it on the bottom or sides of the pot, or the cloth will char. This can be torn into bands and used as required, but the calico lasts in about a year.

## REGISTRATION OF SHOEING SMITHS.

A scheme that will commend itself to horseowners generally, is the suggested provision for the registration of shoeing smiths. Much cruelty and economic loss is attributable to insufficient training of shoeing smiths, and with the idea of obviating this, the Government Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.) has suggested the inauguration of a private scheme under the control of the Master Farriers' Association and a public educational body, such as the School of Mines. The essentials of such a scheme would be instruction, both practical and theoretical, and bodies like the Society for the Prevention of Cruelty to Animals and the Agricultural Society would be able to lend a great help by encouraging competitions at shows, etc. The registration diploma to be issued should state definitely that the bearer had been well instructed and passed an examination, and should offer a short title such as R.S.S., *i.e.*, Registered Shoeing Smith. Existing smiths might be admitted to the register either by examination or payment of a fee or recommendation of the Master Farriers' Association, but it is essential that their register should be separate from that of examinee, and naturally by lapse of time it would become void. If the funds of the examining body permit, instruction should be given also at country centres, and probably the Advisory Board of Agriculture would assist it through the Branches of the Agricultural Bureau.

A similar scheme exists in England, in the initiation of which Mr. Place took an active part, both as instructor and examiner. Although originally inaugurated as a private scheme by the Worshipful Company of Farriers, it is now subsidised to some extent by Government and in addition to the company, the following bodies assist in its being carried out:—The Royal Agricultural Society, the Royal College of Veterinary Surgeons, and the Royal Society for the Prevention of Cruelty to Animals.

The elaboration of a scheme to meet the local conditions is now receiving consideration, the Master Farriers' Association having taken steps to bring about a conference of representatives of interested bodies.

It is to be hoped that the result will be, not only an improvement in the status of farriers, but also the elimination of a good deal of unnecessary suffering on the part of horses.

## ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board was held on Wednesday, August 9th, there being present Messrs. Coleman (chair), Colebatch, Jeffrey, Dawkins, Miller, Tuckwell, Williams, and Finnis (Acting Secretary). Apologies were received from Messrs. Laffer and Birks.

### PEA HARVESTER.

The Mount Barker Branch of the Agricultural Bureau suggested that the Board should use its influence to get the Government to offer a bonus for a machine that would cut and thresh a crop of peas in one operation. The Board was not disposed to take any action in the matter.

### FARES FOR CONGRESS DELEGATES.

Consideration was given to the question of providing fares for two delegates to Congress from each Branch, whether in rail, road, or sea communication with the city. It was decided to request the Hon. Minister of Agriculture to approve of this provision.

### REGISTERED SHOEING SMITHS.

The Master Farriers Association requested the Board to appoint a representative to confer with delegates from other interested bodies to consider the question of inaugurating a scheme for the registration of shoeing smiths. Mr. W. J. Colebatch was selected as the Board's representative.

### LOWER NORTHERN BRANCHES CONFERENCE.

After due consideration it was decided that the 1917 Conference of Branches situated in the Lower Northern District should be held at Lyndoch.

### BLOOD AND BONE MANURE.

At the instance of Mr. Williams it was decided to direct the attention of the Minister to the fact that notwithstanding the heavy local demand for blood and bone manure, supplies manufactured in this State were being disposed of in New South Wales.

### PRESERVATION OF ROADS.

Mr. Dawkins raised the question of the wisdom of limiting the weight of loads to be carried over roads during certain months of the year. He undertook to bring forward suggestions to meet the case, the matter to be dealt with at the next meeting.

### OLIVE OIL.

The Principal of the College (Mr. Colebatch) tabled a sample of oil manufactured at the College at Roseworthy, and members expressed their appreciation of the quality of the product.

## LIFE MEMBERS.

The following names were added to the list of life members of the Agricultural Bureau: Messrs. E. Copley (Orroroo), T. Collett (Strath-albyn), R. Player (Angaston), W. Sibley (Angaston), A. Johnstone (Naracoorte).

Two new Branches were approved. One hundred and forty-six names were added to the rolls of existing Branches.

## ARTIFICIAL MANURES.

Figures given below, and compiled by the Government Statist (Mr. W. L. Johnston), show that the quantity of artificial manure used in this State during 1915-16 was 98,258 tons on 3,040,273 acres, which means an average dressing of 72-4lbs. per acre. Of the area cropped throughout the State, 80-78 per cent. received application of artificial manure. In addition, 88,661 loads of stable manure were applied to 15,678 acres.

The figures are tabulated as follows:—

*Artificial Manures used in Farming.*  
(Compiled from Farmers' Returns.)

Division.	Area Cropped.			Manure Used.	
	Total.	Manured.	Percentage Manured to Total.	Total.	Average per Acre.
	Acres.	Acres.	%	Tons.	lbs.
Central .....	1,273,889	1,024,179	80-40	39,601	86-6
Lower North .....	1,048,450	957,050	91-28	29,589	69-3
Upper North .....	348,523	185,655	53-27	5,069	61-2
South-Eastern .....	502,489	444,731	88-51	12,566	63-3
Western .....	589,792	428,458	72-65	11,423	50-8
Outside Counties .....	427	200	46-84	5	56-0
Total—1915-16 .....	3,763,570	3,040,273	80-78	98,258	72-4
1914-15 .....	3,282,364	2,789,479	84-98	97,421	78-2
1913-14 .....	3,169,559	2,659,608	83-91	97,023	81-7
1912-13 .....	3,062,998	2,588,133	84-50	91,607	79-3
1911-12 .....	2,965,338	2,494,773	84-13	87,475	78-5

In addition, stable manure was used as follows:—

	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.
Loads of stable manure used	134,503	111,434	100,435	103,140	88,661
Acres manured .....	16,357	15,003	15,206	16,455	15,678

## DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on September 1st:—

**BUTTER.**—Soaking rains were recorded throughout the agricultural areas during August, and the quantities of dairy produce coming forward show a further heavy increase on the month previous. There is now a surplus of butter in this State, and this is finding an outlet in other markets. Values have, in consequence, steadily eased, and "Alfa" is now quoted at 1s. 4d.; "Primus," 1s. 3½d.; third-grade creamery, 1s. to 1s. 1d.; choice separators and dairies, 1s. 1d. to 1s. 2d.; store and collectors', 10d. to 11d. per lb.

**Eggs.**—A seasonable reduction in price is to be reported in this line, quantities being marketed continuing to increase week by week, and the production showing a very substantial improvement over the corresponding period of a year ago. Fair interstate trade is being done, and local picklers have also started operations for the season. The rooms, therefore, have been kept nicely cleared, closing quotations, for loose at mart, being:—Hen, 9½d.; duck, 10½d. per dozen.

**CHEESE.**—In sympathy with the lowering in butters, cheese values have further receded, though fair business has been recorded both local and export. Prices now are 7½d. to 8d. per lb. for large to loaf.

**HONEY.**—Another quiet month has been experienced in this line, prices having declined, present rate being 4½d. per lb. for prime clear extracted, while second grades are neglected. Beeswax is being inquired for at about 1s. 5½d. per lb.

**ALMONDS.**—There is no alteration under this heading. Stocks are exhausted, and buyers are already looking forward to the new season's crop. Market is therefore nominally—Brandis, 9½d.; mixed softshells, 8½d.; hardshells, 4d.; kernels, 1s. 5d. per lb.

**BACON** has experienced considerable inquiry, local cured being very short, and importations are coming along to make good the deficiency. Best factory-cured sides are now selling at 11½d. to 1s. ½d. per lb.; hams, 1s. to 1s. 1d. per lb.

**LIVE POULTRY.**—Heavy pennings have been experienced throughout the month, each of our three sales a week being well supplied; but the active competition has readily cleared all offering, with values well maintaining the closing prices of last month. Good table roosters, 3s. 3d. to 3s. 10d. each; nice-conditioned cockerels, 2s. 9d. to 3s. 6d.; plump hens, 2s. 6d. to 3s. 6d.; ducks, 3s. 9d. to 4s. 8d.; geese, 5s. 6d. to 6s. 6d.; pigeons, 10d.; turkeys from 6½d. to 10d. per lb. live weight for fattening sorts to good table birds.

**POTATOES AND ONIONS.**—The Adelaide market has fluctuated in sympathy with Victoria, whence practically the whole of the supplies have been drawn. **ONIONS.**—Quantities in the South-East are about finished, the Adelaide market now drawing from the surrounding Hills and the Colac district of Victoria. Prices are somewhat below the level of our previous report. Quotations:—Potatoes, 27 10s. to 28 10s. per ton on rails, Mile End or Port Adelaide; onions, 25 per ton on rails, Mile End or Port Adelaide.

## THE AGRICULTURAL OUTLOOK.

### REPORT FOR MONTH OF AUGUST.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

*Eyre's Peninsula.*—Weather has been changeable. Good rains have been recorded, 24in. up to date (25th). This is an inch less than was registered during August, 1915, but the total fall for the year to date is 3in. better than that for the corresponding period of last year. Temperatures have risen considerably during latter end of month. Some heavy north and north-west winds prevailed at times. Three frosts and one fog were recorded, and somewhat unusual thundery weather occurred on August 13th and 14th. Crops growing on fallow and land cleared last season are making very good headway; many patches are showing rather rank, but otherwise are very healthy. Wheat sown on last year's stubbles is backward. Natural feed has made good growth during the month on the open bush country. Miscellaneous—Quite a comparatively large number of fruit trees, olive truncheons, and garden plants have been planted in the district.

*Bohोरovic.*—Weather—The first three weeks of the month were very wet; rain fell on nearly every day. This was followed by three bright days. Crops are very backward; the excessive wetness of the ground is causing many to lose their bright color and become yellow in patches. Natural feed is at a standstill, warmer weather being required to make it grow. Stock is in fair condition, but are needing some spring weather to make them improve. Pests—Rabbits are numerous, and trapping is being carried on by the farmers. Miscellaneous—Those farmers on the flat who have made drains are finding the benefit of them this year.

*Kygybolite.*—Weather—The rainfall for this month was a little greater than the average, but the individual falls were light. Shower conditions have been general, with the weather setting in warm at the end of the month. Crop prospects are satisfactory, and although the oat areas have become somewhat discolored, good spring conditions should produce a good recovery. The fodder plant kale is doing wonderfully well in this immediate locality; its value has been definitely demonstrated, and a rapid extension of the area sown is predicted. Natural feed, like the crops, has received a great impetus from the warmer weather now experienced, and is therefore plentiful. Stock—Horses are showing improved condition, cattle are very good, and sheep fair to good. The spring lambing is progressing favorably. Pests—Foxes have caused the loss of a few young lambs. Miscellaneous—Fallowing operations are now becoming general.

*Turretfield.*—Weather—August was a wet month, with only a few fine days occurring at intervals. The rainfall for the month totalled 3.43in. Temperatures were mild, and no frosts of any note were experienced. The 26th proved a sultry day, ending with a thunderstorm during the night, and accompanied by a strong wind. Crops of all description are making good headway. The early sown crops are getting the better of the weeds, and there are few weeds in the later sown fields. Natural feed is abundant. Stock are doing well, and though the horses are looking rough owing to change of coats, they are all healthy, and no outbreak of disease has occurred in the district. Sheep and lambs are also looking well. Pests—Caterpillars are noticeable in large numbers, but so far as can be ascertained are doing no material damage. Miscellaneous—Floods have again taken a goodly number of trees along the banks of the North Para. Owing to the continued wet weather fallowing operations have been somewhat hampered, but farmers are losing no opportunity of working their teams whenever the condition of the soil permits.

*Veitch.*—Weather conditions for the month have proved excellent for the last under crop. The Veitch rain gauge registered 401 points; average for the month, 101 points. Crops are all making good growth, the sand ridges do not look so healthy as the flats. Natural Feed—Good. Stock—All in good healthy condition. Miscellaneous—Fresh areas are being rolled in the district, and 34 had is being fallowed.



## RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall for the month of and to the end of August, 1916, also the average precipitation to the end of August, and the average annual rainfall.

Station.	For Aug., 1916.	To end Aug., 1916.	Average to end Aug.	Average Annual Rainfall	Station.	For Aug., 1916.	To end Aug., 1916.	Average to end Aug.	Average Annual Rainfall
<b>FAR NORTH AND UPPER NORTH.</b>					<b>LOWER NORTH—continued.</b>				
dnadatta .....	—	5.75	3.33	4.76	Spalding .....	4.78	17.95	13.44	20.25
rooola .....	0.31	3.25	5.17	7.58	Guinane .....	3.99	16.30	13.34	19.74
rgott .....	—	2.42	4.16	6.04	Bundaleer W. Wks. ....	4.08	16.49	11.36	17.29
rine .....	0.13	3.84	4.68	6.70	Yacka .....	4.20	14.07	10.72	15.27
igh's Creek .....	0.32	3.71	6.14	8.66	Koolunga .....	4.11	14.25	11.31	15.94
lana .....	0.61	4.86	6.37	9.22	Snowtown .....	4.90	16.83	11.30	15.70
oman .....	1.16	8.23	9.20	12.83	Brinkworth .....	5.30	16.32	10.76	15.48
okina .....	2.28	11.96	—	—	Blyth .....	4.04	15.05	11.53	16.34
werker .....	2.43	12.66	8.58	12.22	Clare .....	6.45	23.71	17.17	24.30
ison .....	1.95	12.19	8.31	11.78	Mintaro Central .....	7.63	24.39	15.25	21.99
rdon .....	1.36	8.95	7.06	10.26	Watervale .....	8.15	25.76	19.25	27.17
rom .....	2.48	13.09	9.79	13.78	Auburn .....	5.12	18.45	17.08	24.25
rt Augusta .....	1.12	6.54	6.45	9.46	Hoyleton .....	4.03	13.03	13.87	17.96
rt Augusta W. ....	1.23	6.56	6.35	9.36	Balaklava .....	3.43	11.47	11.21	16.03
uce .....	1.29	7.78	5.74	10.01	Port Wakefield .....	2.49	11.68	9.61	13.13
ammond .....	1.35	8.02	5.72	11.46	Terowie .....	2.60	9.57	10.12	13.71
ilmington .....	2.34	14.58	13.12	18.26	Yaroomie .....	2.66	10.94	9.42	13.91
ilowie .....	2.11	9.68	7.38	11.90	Hallett .....	3.67	12.19	11.04	16.40
ilrose .....	4.13	21.48	15.75	23.04	Mount Bryan .....	5.52	18.04	10.75	15.73
olbrook Centre .....	2.43	12.21	8.05	15.83	Burra .....	4.64	18.37	13.33	17.82
et Germein .....	1.91	8.23	9.48	12.84	Farrell's Flat .....	5.44	—	13.32	18.87
irebara .....	4.63	19.57	15.70	18.91					
ppila .....	2.56	11.11	8.14	15.08	<b>WEST OF MURRAY RANGE.</b>				
adock .....	1.68	8.24	6.01	10.86	Manoora .....	5.00	16.40	12.45	18.09
uriston .....	1.81	10.66	7.97	12.22	Saddleworth .....	3.94	14.18	13.86	19.69
dnburg .....	1.44	7.59	5.15	10.21	Marrabel .....	6.48	20.85	13.23	18.94
urelia .....	2.05	10.54	8.46	13.24	Riverton .....	4.54	19.18	14.36	20.48
romco .....	1.76	10.96	7.31	13.42	Tarlee .....	3.30	14.76	12.07	17.48
ack Rock .....	1.72	9.97	6.72	12.25	Stockport .....	3.32	15.53	10.91	15.89
tersburg .....	1.89	10.10	7.72	13.07	Hamley Bridge .....	2.77	14.20	11.49	16.45
ngala .....	2.59	12.11	9.50	13.94	Kapunda .....	3.86	18.04	13.75	19.07
					Freeling .....	3.20	16.56	12.42	17.85
<b>NORTH-EAST.</b>					Greenock .....	5.19	22.91	14.77	21.46
polta .....	1.48	8.37	—	—	Truro .....	5.02	19.54	13.78	19.74
ckara .....	1.29	7.40	—	—	Stockwell .....	4.26	18.86	14.01	20.30
mta .....	1.60	5.73	5.49	8.22	Nuriootpa .....	4.56	20.34	14.81	21.25
ukaringa .....	1.21	6.03	5.46	7.94	Angaston .....	5.53	22.56	15.45	22.25
annahill .....	0.60	5.56	5.71	8.46	Tanunda .....	4.44	20.52	15.65	22.28
ckburn .....	0.54	6.06	5.57	7.97	Lyndoch .....	4.50	18.47	16.40	23.01
oken Hill, NSW .....	0.70	5.39	6.71	9.63					
<b>LOWER NORTH.</b>					<b>ADLAIDE PLAINS.</b>				
ort Pirie .....	2.68	10.91	10.27	13.21	Mallala .....	2.32	12.06	11.00	16.88
ort Broughton .....	2.97	14.22	10.20	14.33	Roseworthy .....	3.20	14.28	12.13	17.31
ute .....	4.30	15.71	11.24	15.42	Gawler .....	3.33	17.71	13.63	19.21
ura .....	3.44	15.28	12.48	18.22	Two Wells .....	2.25	13.13	11.89	16.36
altowie .....	3.30	13.12	11.37	17.27	Virginia .....	3.15	14.88	12.64	17.58
amstown .....	3.61	14.71	11.71	17.46	Smithfield .....	3.14	15.31	12.19	17.30
adstone .....	2.99	12.20	10.81	16.00	Salisbury .....	3.81	10.45	13.44	18.57
ystal Brook .....	2.75	13.18	10.88	15.62	North Adelaide .....	4.65	23.06	15.55	21.49
ongstown .....	3.44	15.29	12.68	18.32	Adelaide .....	3.99	20.04	15.37	21.04
aridly .....	3.27	12.22	10.69	16.79	Brighton .....	4.42	19.92	14.33	19.93
edhill .....	4.53	15.95	12.98	16.79	Glencol .....	3.97	17.81	13.38	18.35

## RAINFALL—continued.

Station.	For Aug., 1916.	To end Aug., 1916.	A'v'ge. to end Aug.	A'v'ge. Annual Rainfall	Station.	For Aug., 1916.	To end Aug., 1916.	A'v'ge. to end Aug.	A'v'ge. Annual Rainfall
<b>ADLAIDE PLAINS—continued.</b>					<b>WEST OF SPENCER'S GULF—continued.</b>				
Magill .....	4.42	19.25	19.79	25.69	Streaky Bay.....	1.75	12.35	11.91	15g
Glen Osmond .....	4.92	24.88	18.41	25.26	Port Ellioton .....	2.89	15.66	12.80	16g
Mitcham .....	4.83	22.28	17.19	23.47	Port Lincoln .....	3.28	19.23	15.07	18g
Belair .....	5.69	13.79	21.14	28.64	Tumby .....	1.05	12.08	11.06	15g
<b>MOUNT LOFTY RANGES.</b>					Carrow .....	2.62	13.09	—	—
Teatree Gully.....	5.21	23.40	20.38	28.19	Cowell .....	0.83	6.59	8.33	11g
Stirling West .....	9.23	41.08	34.34	46.70	Point Lowly .....	1.07	8.21	8.14	12g
Uraidla .....	9.85	41.30	32.75	44.35	<b>YORK'S PENINSULA.</b>				
Clarendon .....	5.53	28.33	24.65	33.67	Walleroo .....	2.58	13.38	10.34	14g
Morphett Vale .....	3.85	19.66	16.82	23.32	Kadina .....	3.81	15.89	11.73	15g
Noarlunga .....	3.63	17.39	14.91	20.28	Moonta .....	3.64	16.04	11.27	15g
Willunga .....	3.87	21.75	19.05	25.98	Green's Plains .....	4.50	15.15	11.65	15g
Aldinga .....	3.57	17.43	14.91	20.34	Maitland .....	5.18	22.70	14.77	20g
Normanville .....	3.36	19.89	15.27	20.65	Ardrossan .....	2.82	13.69	10.10	13g
Yackalilla .....	4.54	33.44	16.99	22.78	Port Victoria .....	4.04	16.95	11.23	15g
Cape Jervis .....	1.91	12.64	12.39	16.34	Curramulka .....	3.25	16.49	13.55	18g
Mount Pleasant .....	5.19	24.23	19.28	26.87	Minlaton .....	3.59	18.55	12.95	17g
Blumberg .....	5.99	26.03	21.37	29.38	Stansbury .....	2.90	14.20	12.47	17g
Gumeracha .....	6.68	28.38	23.04	33.30	Warooka .....	3.23	16.29	13.33	17g
Lobethal .....	7.55	32.96	25.79	35.38	Yorketown .....	3.25	16.04	12.80	17g
Woodside .....	6.04	25.59	22.85	31.87	Edithburgh .....	3.35	16.54	12.11	16g
Hahndorf .....	6.46	26.11	25.45	35.45	<b>SOUTH AND SOUTH-EAST.</b>				
Nairne .....	4.61	20.14	20.58	28.83	Cape Borda .....	3.46	20.44	19.81	25g
Mount Barker .....	6.23	26.08	22.17	30.93	Kingscote .....	2.99	17.71	14.35	18g
Echunga .....	5.90	26.03	23.73	32.83	Peneshaw .....	2.90	16.96	15.97	21g
Macdesfield .....	4.72	23.81	21.76	30.72	Cape Willoughby .....	3.56	20.66	14.40	19g
Meadows .....	7.12	31.70	25.43	35.52	Victor Harbor .....	2.36	13.94	16.08	23g
Strathalbyn .....	2.18	14.28	13.74	19.28	Port Elliot .....	2.23	12.82	14.63	20g
<b>MURRAY FLATS AND VALLEY.</b>					Goolwa .....	2.09	14.01	12.88	17g
Wellington .....	2.61	10.62	10.31	15.01	Pinnaroo .....	3.51	11.48	11.33	16g
Milang .....	1.52	9.04	11.62	16.08	Parilla .....	2.94	12.90	—	—
Langhorne's Bridg .....	1.90	9.13	10.60	15.27	Lameroo .....	3.43	13.31	10.88	16g
Tallem Bend .....	1.90	10.00	—	—	Parrakie .....	3.17	10.99	—	—
Murray Bridge .....	1.51	8.25	9.90	14.32	Geraanium .....	3.43	13.14	—	—
Callington .....	1.97	10.21	11.04	15.65	Peake .....	2.87	12.50	—	—
Mannum .....	1.41	7.16	8.23	11.67	Cooke's Plains .....	3.28	13.34	10.18	15g
Palmer .....	2.23	10.87	10.58	15.60	Meningie .....	3.77	17.22	13.33	18g
Sodan .....	2.81	10.78	8.48	11.92	Coomandook .....	4.04	15.44	—	—
Blanchetown .....	1.89	5.22	7.25	10.71	Coonalpyn .....	3.68	14.93	12.21	16g
Endudra .....	3.94	15.30	12.09	17.33	Tintinnarra .....	4.06	15.37	13.09	18g
Satherlands .....	2.74	9.83	7.19	10.40	Keith .....	3.63	14.09	—	—
Morgan .....	2.06	6.76	6.01	9.29	Bordertown .....	3.26	13.52	13.30	18g
Overland Corner .....	2.47	5.94	7.37	11.42	Wolsley .....	3.39	13.49	11.97	17g
Renmark .....	2.46	6.85	7.81	10.93	Frances .....	2.87	12.45	13.76	20g
Loxton .....	3.07	9.34	—	—	Naracoorte .....	3.50	15.35	15.55	22g
<b>WEST OF SPENCER'S GULF.</b>					Penola .....	4.08	17.77	18.71	25g
Encla .....	1.56	7.45	7.60	10.13	Lucindale .....	3.36	16.30	16.66	23g
White Well .....	0.90	9.27	6.86	9.67	Kingston .....	3.64	18.20	18.34	25g
Fowler's Bay .....	1.75	11.48	9.54	12.11	Robe .....	3.02	23.10	18.76	24g
Penong .....	1.86	14.70	9.11	11.93	Beachport .....	3.44	24.59	21.21	27g
Murat Bay .....	1.75	10.11	—	—	Millicent .....	5.49	26.18	21.75	29g
Smoky Bay .....	1.56	10.43	—	—	Mount Gambier .....	4.89	22.06	22.38	28g
					C. Northumberland .....	4.98	20.73	19.58	26g

## THE AGRICULTURAL BUREAU.

### CONFERENCE AT TALEM BEND.

A Conference of delegates from the Branches of the Agricultural Bureau served by the Pinnaroo, Brown's Well, and Waikerie railway lines was held in the institute, at Talem Bend, on Thursday, August 31st. Mr. R. Upton, Chairman of the Coomandook Branch, presided, and there were also present the Minister of Agriculture (Hon. C. Goode, M.P.), Mr. W. J. Spafford (Superintendent of Experimental Work), Mr. Henshaw Jackson (Wool Instructor to the School of Mines), and Mr. F. Coleman (Chairman), Mr. G. Jeffrey, and Mr. H. J. Finnis (Acting Secretary of the Advisory Board of Agriculture). There was a large and representative gathering of delegates.

The Chairman welcomed the Minister of Agriculture, the departmental experts, and the members and officers of the Advisory Board, and said that he was pleased to see such a representative gathering of farmers, especially as the Bureau was almost their only source of agricultural education. Unfortunately agriculture was not taught in their schools. Most of the country schools were in charge of young women from the city and suburbs, who were not tutored in agriculture, and it was utterly impossible for them to impart the principles and instil a love of the subject into the children. They were indebted very largely for the progress which had been made, to the departmental experts.

### OPENING ADDRESS.

The Minister of Agriculture, in acceding to the Chairman's request to open the Conference, said the Government realised the burden of the war, and it was necessary to wring from the soil the utmost in wealth and produce. Their hope for the future was to settle the lands more closely than at present, and closer settlement must be pushed on with the utmost rapidity at their command, not only in the direction of settling men on the soil, but of getting more from the land under cultivation than they did at present. They had large problems to face in regard to the occupation of land, especially in the mallee country, and the Agricultural Department would make every effort to cope with them, and would carry out to the utmost experimental work to enable the farmers to do the most with the land they had in occupation. The Government realised that for many years wheat-growing would be

their staple product so far as the mallee country was concerned, but they had to look in other directions and not depend on wheat alone. Some of the settlers along the line had been doing valuable experimental work, and he hoped that it would give financial gain to themselves and that they would impart their experience to their neighbors.

#### CONSERVATION OF FODDER.

The high price of stock forced their attention in the direction of carrying more stock and replenishing the depletion caused by the drought so that they might be prepared for the next drought when it came along. That could be done by conserving fodder. The cocky chaff which they despised should be saved for the time of drought, for, just as surely as the sun would rise on the morrow, the drought would come again, and they should be in a position to meet it by having stored the fodder which was going to waste. They could then face the position with safety instead of living from hand to mouth as they did at present, with nothing to fall back upon.

#### IRRIGATION.

He hoped that they would be able to do something in the Pinnaroo area to conserve water suitable for irrigating those lands. If bores were carried to a greater depth he thought it would be proved that they had artesian or sub-artesian supplies in the Pinnaroo district. None of the bores in the areas suitable for irrigation had been carried to a depth which would test the possibility of raising it to the surface, for it was doubtful whether water could be raised 200ft. or 300ft. by any known appliance in the way of pumping at a sufficiently low cost to make irrigation a profitable proposition. One of the leading manufacturers in Adelaide had told him last week that he was expecting a new engine to come to hand shortly which he anticipated would very largely reduce the cost of pumping, and he would then submit a price for raising water from 200ft. for irrigation purposes. There was an overflow of water in the mallee east of Pinnaroo, at Alexandra, and at Tintinara, so it seemed possible, as they had three points of a triangle at which a water supply could be obtained, they might find it between those points. If so, the future of that country, where the water was suitable for irrigation, gave great promise. If they could not get an artesian or a sub-artesian supply, they might get the present supply by some mechanical means at a low cost, which would enable each farmer to have five or six acres under lucerne, which would give him feed during summer, and enable him to increase the output of his farm, and add to the wealth of the State. By such means sheep could be kept more profitably, and

from a dairying point of view, if each settler had half a dozen cows in full milk they could understand what an increase it would mean to the dairying industry. He was going to have a fresh investigation made by the Government Geologist, and though they reported against artesian water in that area—they admitted that they could not always tell from surface indications what was lying below—it was worth while putting down a bore to a depth to test the country from a water supply point of view. If anything were possible along that line they would seek to discover it, and he trusted that, whether his surmise in that direction proved correct or not, they would be able to do something with smaller bores which would give them an indication of what could be done. He had also in his mind that the Government should be prepared to finance irrigation plants on easy terms, so that settlers might take advantage of it where the departmental officers recommended that it was practicable. He fully appreciated the difficulties which the farmers in that district had to contend with, and he admired the spirit with which they had gone into the mallee and battled against adverse conditions and came up smiling time after time. That there were so many producers there who took an interest in the Bureau was an indication of their spirit, and he was glad to see so many throughout that area who were taking sufficient interest in the work of the Bureau to attend the Conference. He hoped that the discussion which would take place on the papers would bring about improved methods which would enable them to face the future with greater confidence. He had very much pleasure in declaring the Conference open.

#### SUBSIDIES FOR SILOS.

Mr. F. Norton (Geranium) proposed a vote of thanks to the Minister of Agriculture for his sympathetic and able address. He referred to the necessity for mixed farming, and approved heartily of the suggested assistance from the Government to enable farmers to secure irrigation plants. In Victoria the Government gave subsidies in connection with the establishment of silos. He did not know anything more useful where mixed farming was practised than a good silo. If the Government would consider a scheme to finance farmers in erecting silos it would be a good thing. They should not be dependent on the vagaries of the seasons, otherwise they would always be buying when everyone else was buying, and selling when everyone else was selling, and they must avoid that.

Mr. A. J. A. Koeh (Lameroo) seconded the motion, which was carried with acclamation.

The Minister of Agriculture, in reply, said that he had attempted to do a little in experiments himself, but his many ministerial duties

prevented him giving personal attention to his farming. He had obtained from Western Australia a special seed oat, and the Sunrise oat from New South Wales. He would test the seed, and if he obtained good results he would see that it was distributed among the farmers of that district. He had secured from New South Wales a wheat called Sunset, which matured two weeks earlier than Bunyip, which they knew grew early. In that district, if they could get an early maturing wheat it would be very beneficial. They could rely upon sympathetic administration in regard to experimental research work on behalf of the producers of South Australia. Mr. Norton's suggestion in regard to subsidising silos was one he would bring before his colleagues, and he hoped to announce, at the coming Congress, that something along those lines might be done. (Applause.)

#### CEREAL GROWING AND STOCK RAISING.

Mr. H. Ledger (Pinnaroo) read a paper on cereal growing and stock raising. "In treating this subject," he said, "it is right to place wheat growing first. Of course we as farmers are taking the subjects in combination, cereal growing and stock raising. Wheat has played such an important part in the building up of our State that we cannot overlook the fact of its importance as a primary production in maintaining us as a sound and prosperous country. It is well known that our Australian wheat commands a very high, if not the highest, place in the English market for an all-round wheat, and is much sought after for mixing purposes. Then we must grow wheat, but how are we to grow it to the best advantage? We all know, when we first rolled down the scrub and got a good burn and fair rains, it was not a difficult matter to grow wheat, and if our land would continue to respond as it does for the first two crops, there would be no need for us to look much further for a profitable undertaking. Experience, however, has taught us that those early results cannot be maintained by continual cropping with wheat. The ground becomes impoverished in the necessary wheat foods, so that wheat growing becomes unprofitable. Our chief object therefore, should be to make our ground more fertile every year. That cannot be done by sowing wheat, burning off the straw, and sowing wheat again, and so on, nor even by the best methods of fallow. The ground must have some form of vegetation returned to it, or it will eventually fail to produce a profitable crop. Nature will ultimately come to the rescue and grow us a fine crop of what is commonly called mustard, which, in my opinion, is not an unmixed evil. But we must grow the crop that will bring in the best return and still maintain our ground in good condition or leave it in a better state for wheat grow-

ing. That crop, I maintain, is oats. The man who grows the most oats first, will grow the most wheat last. These two cereals make the best combination, and I am satisfied in our mallee country, where oats have been grown, wheat will grow. The question has often been put to me 'what are you going to do with all the oats?' I contend that a man should not complain when he has feed. It is when he has none that the pinch comes. I should like to say here a little about harvesting oats. It is a well-known fact that if oats are left until ripe, which they must be if reaped, and there should come a windy day, there will be a considerable quantity shaken out. Therefore every effort should be made to cut with the binder, just before they are ripe. If the crop is sufficiently high you can cut a foot from the ground if you like, and then stack it ready to be threshed. There are several threshing machines on the market. The oaten stubble will burn after being cut with the binder. If the ground be sandy the oats require to be sown thickly, and you can follow on next year with a crop of wheat.

"This brings me to the other phase, that is, of stock raising, and it ought to be in the form of stock raising, because to buy stock in any quantity is almost prohibitive. First of all there is the horse. The farmer who does not take a pride in his horses will always be handicapped. Get the best you can, breed the best you can, and feed all the time, and oats are a splendid all-round feed. Every farmer should have two or more cows, but, if a man is a bachelor or a young married man, and has a thousand acres to clear and cultivate, it is useless to think of going in extensively for dairying. Where the family is large enough, with a liking for this class of work, there is no doubt about there being money in it. It behoves every farmer to establish a flock of sheep. Get the best you can afford. It is wonderful what good feeding will do, in fact, there is more in good feeding than good breeding. No matter how good a breed you get, if you do not feed properly it is no use. By starting with an ordinary animal, you can always improve. My idea is to get a line of ewes, after you have got the feed. Do not get the ewes first, and think you are going to get the feed after. I should like to suggest sowing an area, and allowing to carry say four sheep to the acre, according to the number you intend to purchase, in a suitable paddock with oats or barley. By this means you have feed for ewes that you could get to lamb early, say in April, if possible. I do not like to have ewes lambing in the cold and wet, and early lambs generally command a big price. This method saves hand feeding. Perhaps a little care may be necessary to see that they do not founder. I put ewes on a fair crop of unthreshed barley, and it had no ill effects. I am no advocate for straw stacks for stock. A straw stack is good

shelter, and stock will eat it if they cannot get better. The same remarks apply to cocky chaff, but remember if you want prime stock you want prime feed every time. Have a straw stack and save your cocky chaff by all means, but only to sell to the other fellow or to use in case of emergency. For instance, you may see a line of stores you could buy and hold if you have feed, even in the way of straw, but even so, it is far better to give them the very best. Therefore aim at securing a plentiful supply of feed, and things should go on all right.

"Sheep will eat what other stock will not, but I do not advocate keeping sheep as scavengers alone. They will go a long way towards keeping your fallow clean, but do not forget to use the cultivator instead of half starving your sheep to keep it clean. Fat stock always sell well. Sheep also distribute their droppings more evenly over the land, and therefore are to be preferred in this to other forms of fertilisation. They help to enrich the soil, they supply you with meat, and, taking into consideration the cutting up of the big estates whence our supply used to come, the country must look to the farmer to grow its wheat, meat, and wool."

Mr. F. Norton (Geranium) said that until they grew oats they would not grow profitable wheat crops. At Pinnaroo they could not grow wheat before they grew oats. Two farmers at Pinnaroo reaped 25bush. to the acre, after two crops of oats, and that was just double the previous yield. With oats and ensilage they could overcome all difficulties, because they could not rely upon early rains to grow early fodder. They could not solve the problem of mixed farming until they supplemented the feed by conserving fodder. Barley grew slowly. He found early wheat the most rapid grower, and it supplied more feed than anything except rye. If oats were sown in early March with 40lbs. of super. and  $\frac{1}{2}$ bush. of seed, they could have April, May, and part of June for putting in their ordinary crops. If they secured 18bush. to the acre the return at 1s. 6d. per bushel would be 27s. per acre, and they were growing on land which was not only giving them feed, but renewing the soil. He was satisfied that oats were the solution of the whole problem of mixed farming.

Mr. Gray (Claypan Bore) said that growing oats was the best method of overcoming the takeall difficulty. Oats thrived on sand lands where wheat did poorly. He had reaped 18bush. of oats from one sandhill, and only 3bush. of wheat from the next hill. Last season he got the best returns from the lands where oats had been grown previously. They could grow oaten hay for 25s. per ton, and it was worth £2 10s. per ton to feed sheep. He would like to hear the opinion of the Conference as to the effect growing barley had in improving the soil.



Mr. W. J. Spafford (Superintendent of Experimental Work) said that mustard, to which Mr. Ledger had referred, was a blessing in disguise, for if they had mustard they had to work. If they had mustard they could also grow kale. Plants of the same family would grow successfully. In that district it was not usually recognised that the land was comparatively poor, and the cropping capacity was growing less, because they were losing in organic matter. That could be returned to the soil by livestock, which also had the advantage of creating a new interest in life for the farmer. In time they would grow wheat, not every other year, nor every three or four years, but once every five years.

Mr. Sanders (McNamara Bore) said that with Algerian oats they got very little feed until October. Barley was practically the same.

Mr. A. J. A. Koch (Lamerloo), referring to the shedding of oats, said that though the oats fell on the ground they were not always lost. Before the drought he had oats which would yield six to eight bags to the acre. The north wind came and they disappeared. He reaped only 3bush. to the acre. They put sheep in and they lived and fattened on the fallen seed, and when the first rains came he had beautiful feed.

Mr. Spafford said that the Cape oat was the earliest, and a great deal was grown in the South-East; but it was always prone to go down. It made very rapid growth from the period of germination. The Sunrise oat, which the Minister had mentioned, would, he thought, fill the bill. It grew like the white oat, and seemed like a cross between the white oat and the Algerian, and was very quick and vigorous. There had been practically nothing done with oats in South Australia.

The Minister of Agriculture said that he would see that experiments were carried out with the seed he had from New South Wales and Western Australia with the view of finding what would give the best results. It should be done at the expense of the State.

Mr. Henshaw Jackson, referring to feeding of sheep, said that it would pay to conserve the straw and cocky chaff and have a crushing machine on the farm. They could then make a mixture of cocky chaff or straw with ½lb. of crushed oats, which they could increase up to 1½lb. per day per sheep, and they would get fat sheep.

Mr. Ledger said he would, as a final word, say grow wheat and feed your stock, and grow oats and feed your stock again. In regard to the suggestion of feeding crushed oats to sheep, he believed that pollard would be better.

#### DAIRYING ON THE MALLEE.

A paper on dairying in the mallee was read by Mr. G. E. Gregory as follows:—"Mallee country is not the most suitable for dairying, but

still a few cows on the farm are very profitable animals to have. The return from, say, six cows in 12 months will go a long way towards keeping the home supplied in living requisites, and if given a liberal quantity of feed during the dry time of the year they will return a handsome profit over and above the cost of the extra feeding. I find bran mixed with copra cake given with scalded cocky chaff is very good for milking cows. The chaff should be scalded some time before feeding. Scald the morning meal over night, and cover the box with empty bags to keep the steam from escaping. The steam softens the chaff. Then mix the bran and copra cake with the chaff, and feed to the cows either before or after milking is finished. I prefer feeding before milking, so that the cows shall be ready to go into the paddock as soon as the milking is done. The Holstein is a good cow for the farmer, being a heavy milker, a good creamer, and good for beef. It does not pay to keep a cow until she is old. When a cow reaches the age of eight years, the sooner she is disposed of the better—that is, looking at it from a milking point of view. A farmer may happen to have an exceptionally good milking strain in an old cow, and he may wish to rear some young stock from her. In that case it will pay him to keep her and get as many as possible of her kind. I intend doing my best to improve my herd by breeding from a good sire. There is another point the farmer should study with regard to dairying in the mallee, and that is he should have the cows to come in when the produce realises the best price. March is a good month to have newly calved cows coming in. They will milk well right through until Christmas, or even longer. Some cows will milk for 12 or even 18 months. I believe in milking young cows at the least, say, 12 months, or even 18 months, as they seem to make better cows afterwards. Cows, used with a certain amount of commonsense, are one of the best, if not the best, paying animals a farmer can own. By keeping cows the farmer can always have pigs, and by having pigs he can kill his own meat throughout the winter months, when meat is scarce and dear."

#### DIPPING SHEEP.

On behalf of the Chief Inspector of Stock (Mr. T. H. Williams), Mr. Coleman drew attention to the provisions of the Stock Diseases Further Amendment Act, 1915. It appeared advisable that sheep owners in the districts which were affected by the provisions of that Act should know what they were required to do. Briefly, he would point out that the Act made it compulsory for every owner of sheep in the whole of the districts of Alexandra and Victoria, and all that part of the district of Albert lying to the south of the railway line running from Tailem Bend through Pinnaroo to the Victorian border, to dip all his sheep during

the period between the first day of September of each year and the end of the following January in a poisonous powder dip. From the above it should be quite clear to all sheep owners in the district referred to, which, by the way, included Kangaroo Island, that if they persisted in dipping their sheep in non-poisonous dips, or so-called carbolic liquid dips, they were failing to comply with the requirements of the amending Act, and would be liable to prosecution for not having dipped their sheep in a poisonous powder dip within the dates specified. After the last day of January of each year all that the inspector of stock would have to do in the districts affected by the Act was to proceed against any sheep owners who had failed to dip their sheep, no matter whether they were free from lice or ticks or not. For the purpose of the Act, the districts were infected areas, where all the sheep were infected stock. No owner of infected sheep might leave or allow such sheep to stray on public roads, lands, commons, or reserves, nor might he leave any infected sheep travelling from place to place on roads, commons, or reserves. No person might remove any infected sheep from the lands on which they were kept or depastured without permission from an inspector of stock. No owner or other person might expose lice or tick infested sheep in any market, whether public or private. It might be as well to point out that any agent, acting on behalf of the owners of sheep found infected, was just as liable to prosecution as the owners. In conclusion, he sincerely hoped that sheep owners in the districts mentioned, and, in fact, in every place where sheep were found infected with lice or tick, would give that matter the very serious consideration it needed. It was a reproach to owners individually and collectively that there should be a heavy annual loss owing to their neglect to keep their sheep free of lice and tick. Clean, sound wool meant high values, and broken, stained, and weak fleeces, low prices.

Mr. E. Tillbrook (Monarto South) said that one dipping was not sufficient to kill lice. Sheep infected with lice should be dipped a fortnight after tailing, and again in January or February. Lice were more difficult to kill than tick. The first two or three sheep in the dip should go through again, because the mixture was not properly stirred up at first.

Mr. Winkler (Stock Inspector) said that sheep should be dipped twice.

Mr. Henshaw Jackson said that there was an obligation on anyone using powder dips to see that they were properly mixed. Unless powder dips were properly stirred a proper result could not be attained. Good soft water was essential. If the water were hard, it could be softened with caustic soda in the proportions of 5lbs. to

1,000galls. of water. Non-poisonous mixtures were of no use, and it was only waste of time and money to buy them. The sheep should be dipped whether clean or not, as the dip acted as a skin tonic, and a clean-skinned sheep was a healthy sheep.

The Minister of Agriculture said that all sheep owners, whether within the line defined in the proclamation or not, were compelled to dip their sheep if they were infected. He dipped his sheep regularly, because it had a good effect. If there were any parasites it got rid of them, and kept the sheep in better health. It firmed the wool, and prevented the dust getting down to the skin. The proclamation was under a new Act passed last session, and therefore directions would be sent out giving instructions how to dip.

Mr. Winkler said that the farmers should co-operate and construct a dip at the most suitable central place, instead of each constructing a dip of his own.

#### SHORTAGE OF SHEEP.

Mr. Henshaw Jackson delivered an address on the shortage of sheep and said that, in some quarters, he was regarded as pessimistic on the subject. People said that the recuperative powers of the back country were such that in a few years they would stock up again. He doubted it. The back country was not the back country that it had been. Where were the countless millions of rabbits which had been all over the place, and what effect had they upon it? They knew that vast saltbush areas had been killed by disease. He could take them to hundreds, perhaps thousands, of acres, which were once covered with saltbush, but were now only scrub, with bits of stick. Plains which had been covered with grass were now only sand and rubbish. All the rain in the world would not bring the saltbush back or make the grass grow on those plains. In places they cut scrub and sheoak to feed the sheep. The lambs this season would be fewer than ever, and the sheep were looking pretty miserable. The sheep left were mostly old sheep, whose time for breeding was pretty nearly out. He was firmly convinced that in future, in the numerical strength of sheep in South Australia lay the inducement which existed for sheep farmers to establish on their holdings permanent flocks. He had been told that if they had that they would have nothing but crossbred sheep, but what did it matter? It was not every district that was so situated as to run crossbred sheep and produce the class of lambs they expected from crossbreds, because they cannot produce the right kind of feed for the right kind of lamb. There they would have to depend on the Merino. It had been said that the Merino would not feed, but had anyone tried the experiment? If not, they should test it. He would

undertake, if given 500 Merinos, that he would have them feeding out of his hand inside of a fortnight. People out of Adelaide were doing it as a business. They bought the sheep, fed them by hand, and turned them over to make a profit. The Merino sheep of South Australia—he referred to the sheep called the South Australian Merino, which came mainly from the Northern Areas—was a class of sheep which he did not think could be beaten in the Commonwealth. The frame was well grown, and it produced a valuable fleece, had a good carcass, and took a lot of beating. In those districts where crossbreeding could be satisfactorily undertaken—and they knew their own districts best—if they asked him what cross he preferred, he would say at once the Leicester and Merino. The Leicester-Merino was a sheep which produced wool of excellent quality. The Leicester itself was the finest of the long-wool English breeds, and it had quality in every line. It imparted all its good qualities in the crossbreeding, and none of its bad ones. It was a bit smaller than the Lincoln, but it was a good doer. They would live on an absolute minimum of feed. Four years ago, in Mount Barker, when there was not a vestige of feed to be seen, the sheep there were rolling fat. In regard to the position of breeding for fat lambs, he came to the Southdown, which had the finest wool of the English short-wool breeds, and its carcass was the plum of the market. He had nothing against the Lincoln, which did very well in rich bush pastures, such as those at Mount Gambier. In country of that sort, it would give a better cross. Whilst he advocated the Leicester, he would not say that it was absolutely the best. So far as tests which they had been making in New South Wales for a number of years went, from a wool and butcher's point of view, the Border Leicester and Merino cross was the best. So far as results in Australia went, the Border Leicester stood first, and the Leicester and Lincoln Merino crossbred was second, but there was not much between either of them. They could grow more sheep and better sheep in Australia than in any place in the world, and every farmer should have as many sheep on his place as it would carry. They would make more money if they sent the wheat to market on their farm in the form of feed for the sheep. Some said that it could not be done; but it was done in their own district. At Bookpurnong he saw 600 sheep being fed. He asked what the chaff cost laid down to the sheep, and it figured out at £1 2s. 6d. per ton, and that included an allowance for every operation from the turning of the land to putting the chaff in bags. It figured out, also, that the farmer was getting £1 16s. 8d. per ton more for chaff in that way than if he had sold it in the market at the then ruling rate of £3 per ton. He did not want to put them off wheat growing, but to make them combine it with sheep raising. It was

worth while, even if they had only half a dozen sheep. Reliable experiments showed that 1,000lbs. of chaff would feed 1,000 sheep every day, and it would not take a man or a boy long to feed that 1,000lbs. of chaff to the sheep every day. He thought that the work might be done even by girls. If they kept their sheep in decent condition, they would be surprised to find what a little it took to maintain them so; but once a sheep got down, it required a lot of money to bring it back. If ewes were too fat, they would have a lowered percentage of lambs, but when they were in lamb they could be treated better, and when they had dropped their lambs they could not be treated too well. They should find out the type of sheep suitable to the district, and every man in the district should breed the same type, so that the district should always be able to send the same kind to the market. The great difficulty at present was to get sheep. As soon as they got them, they would be more valuable. Lambs on the market now realised from £1 to £1 10s., whereas formerly only 6s. to 12s. could be got. Japan was coming into the market for wool and mutton, and if China came into the market too, there would not be sufficient wool to give every Chinaman a waistcoat. If any of them had money to spare they should put it into sheep and feed them.

#### DESTRUCTIVE DOGS.

Mr. P. H. Edwards (Pinnaroo) said that dogs were a serious cause of loss among sheep farmers. He knew of one case where a farmer had lost 50 sheep in the year through dogs, and had determined to abandon keeping sheep, because the losses from dogs were so great. He moved—"That this Conference recommends that steps be taken to so alter the 'Dog Act' as to give greater protection to flock owners."

Mr. H. Ledger (Pinnaroo) seconded the motion, which was carried unanimously.

#### FODDER GRASSES.

Mr. F. W. Eime (Lameroo) said that they could grow clover on the sandy lands, as they did not get much wheat from them. He thought they might grow grasses for their sheep. He would be glad to know the best grass to grow.

Mr. Spafford said that it was a difficult matter to say offhand what grass should be grown. Last year they tried about 20 varieties, and they meant to do better this year. Imported grasses were the only ones they knew anything about under cultivation. Of those prairie grass was most likely to be suitable. It was doing remarkably well in light soils with some rain. It germinated early, and made good feed. Other good grasses were sheep's fescue and Bokhara clover. Rhodes

grass was essentially a summer grass, and they had no summer rains. Silver beet was also a summer-growing plant.

Mr. Norton said that he had been experimenting, and he had had sufficient encouragement in the dry years to be satisfied that there were three or four kinds that would do well in that district, but whether it would pay, considering the price of seeds, he could not say.

Mr. Spafford said that if it was a question of producing fodder for the fields, lucerne stood alone. Three or four pounds of lucerne drilled in would give splendid results. In loamy, sodden soils lucerne stood alone.

#### FUTURE CONFERENCES.

Mr. A. J. A. Koch (Lameroo) moved—"That the interests of the respective districts will be better served in the future by the subdivision of the present Pinnaroo and Brown's Well lines district, and that in future one Conference be held for the Pinnaroo district, and another for the district represented by the Brown's Well, Paringa, and Waikerie lines."

Mr. P. H. Edwards (Pinnaroo) seconded the motion, which was carried unanimously.

Votes of thanks were passed to the Advisory Board and the officers of the Department of Agriculture, and the proceedings terminated with the singing of the National Anthem.

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#### IMPORTS AND EXPORTS OF PLANTS, FRUITS, ETC.

During the month of July, 1916, 605bush. of fresh fruits, 13,476bush. of bananas, 18,343 bags of potatoes, 1,038 bags of onions, 6,849 packages of vegetables, and 195 packages of plants, seeds, and bulbs were examined and admitted at Adelaide and Port Adelaide under the "Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910;" 84bush. of bananas (over ripe), and 10 bags of potatoes were destroyed. Under the Federal Commerce Act 432 cases of fresh fruits, 12,689pkgs. of dried fruits were exported to oversea markets. These were consigned as follows:—For London, 9,799pkgs. of dried fruit; New Zealand, 432 cases citrus fruit; 840pkgs. of dried fruit; and Canada, 2,050pkgs. of dried fruit. Under the Federal Quarantine Act 1,405pkgs. of seeds, &c., containing 240,172lbs. were examined and admitted from oversea markets; 2cwts. of cress were cleaned on account of weed seeds.

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Mount Bryan East.....	141	—	—	Sandalwood.....	†	—	—
Mount Compass.....	165	—	—	Sherlock.....	*	—	—
Mount Gambier.....	†	—	—	Spalding.....	*	17	23
Mount Hope.....	145	—	—	Stirling's Well.....	157	—	—
Mount Pleasant.....	†	—	—	Stockport.....	†	—	—
Mount Remarkable.....	†	—	4	Strathalbyn.....	†	12	10
Mundoo.....	*	—	—	Sutherlands.....	*	—	—
Murray Bridge.....	†	11	9	Tantanoola.....	†	2	7
Myponga.....	†	13	11	Tarcowie.....	138	12	10
Myrka.....	*	—	—	Tatiana.....	168	2	7
McNamara Rote.....	154	—	—	Tintinnaria.....	*	—	—
Nantawarra.....	†	—	—	Two Wells.....	144	—	—
Naracoorte.....	166-7	—	—	Craiddale and Summert'n.....	†	4	2
Narridy.....	†	—	—	Waikerie.....	157-60	—	—
Narung.....	*	—	—	Warcowie.....	†	—	—
Netherton.....	155	—	—	Warrow.....	*	—	—
North Booborowie.....	*	—	—	Watervale.....	†	—	—
North Bundaleer.....	*	—	—	Wepowie.....	138-9	9	7
Northfield.....	143	5	3	Whyte-Yarcowie.....	141	—	—
Orroroo.....	*	—	—	Wilkawatt.....	160	—	—
Parilla.....	†	7	5	Willowie.....	*	12	10
Parilla Well.....	162	—	—	Wilmington.....	*	—	—
Parrakie.....	155	2	7	Wirrabara.....	139	—	—
Paskeville.....	*	—	—	Wirrega.....	†	—	—
Penola.....	†	—	—	Wollosa.....	†	—	—
Penong.....	146	9	14	Woodleigh.....	151	11	9
Petina.....	*	—	—	Woodside.....	†	—	—
Pine Forest.....	*	—	—	Wynarka.....	†	9	—
Pinnaroo.....	155	—	—	Yabmana.....	150	—	—
Pomeroo.....	162	14, 28	12, 26	Yacka.....	†	—	—
Port Broughton.....	*	—	—	Yadnarie.....	†	9	—
Port Elliot.....	†	16	21	Yallunda.....	*	—	—
Port Germein.....	140	16	—	Yaninee.....	146-9	—	—
Port Pirie.....	*	9	7	Yeelanna.....	150	—	—
Quorn.....	†	9	7	Yongala Vale.....	141	11	9
				Yorketown.....	*	—	—

\* No report received during the month of August.

† Formal report only received.

‡ Held over until next month.

## ADVISORY BOARD OF AGRICULTURE.

## Dates of Meetings—

September 13th and October 11th, 1916.

## THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

### REPORTS OF BUREAU MEETINGS.

#### UPPER-NORTH DISTRICT.

##### (PETERSBURG AND NORTHWARD.)

MORCHARD (Average annual rainfall, 11in. to 12in.).

May 20th.—Present: 13 members and four visitors.

IRRIGATION.—Every farmer should endeavor to secure a water supply sufficient to irrigate a few acres, urged Mr. Charles Longbottom in a paper on irrigation, in order to provide a supply of green fodder in the summer and fruit and vegetables, besides being an invaluable asset in time of drought. Useful engines which would pump 500ft. could be purchased at very low cost and very small consumption of petrol. At many places along the great creeks dams might be erected, and large quantities of fresh water impounded for irrigation purposes. Side wing walls might be erected to carry off the floodwaters, which might be impounded again lower down. If several farmers combined to irrigate a suitable spot good fodder might be secured for summer and early lambs successfully raised. Mr. J. W. Reichstein said that if artesian water could be obtained by boring in that district it would be very useful for watering small plots of fodder, lucerne, &c. A double action pump worked by an engine would give a reliable supply of water. Mr. B. S. McCallum said that a little irrigation should be done on every farm, if only surface water were run to suitable places, causing them to be well flooded. On such spots almost anything could be grown. Dams could be sunk in suitable catchment places if the holding ground were right, and the waste could be run by gravitation to the required area. Mr. G. Gregory said that a little irrigation could be done on every farm if the farmers would only put their minds to providing a good water supply.

TARCOWIE (Average annual rainfall, about 15½in.).

June 14th.—Present: eight members.

MANURIAL TESTS.—At the experimental plots, each quarter of an acre in area, the subjoined results were obtained. The plots were followed on November 14th, 1914, to a depth of 4½in., sown with Fairbank wheat on May 28th, 1915, and harvested on December 24th, 1915. Rainfall 9in. On each of the three plots 60lbs. of wheat were sown, and the yields were as follows:—No. 1, 60lbs. of super., 15bush, 9lbs., value £3 0s. 8d.; No. 2, 100lbs. of super., 16bush, 2lbs., value £3 1s. 2½d.; No. 3, 150lbs. super., 20bush, 8lbs., value £3 18s. 3½d. The result was a justification for the larger quantity of super. especially as the wheat sown was a hay variety. It was decided to make further tests as to the quantities of manure during the ensuing season, with 100lbs., 150lbs., and 200lbs. of super. in conjunction with another variety of wheat. At previous meetings Mr. J. P. Smith read a paper on "Drenching and Slinging Horses and Cattle," and Mr. W. S. Bennett read a paper on "Co-operation."

WEPOWIE (Average annual rainfall, 13in. to 14in.).

July 22nd.—Present: nine members and one visitor.

BLACKSMITHING ON THE FARM.—A blacksmith's shop on a farm should be built of stone or iron, and measure at least 16ft. x 18ft., and be 8ft. in height, measurements which were sufficient to allow the entrance of any large implement for repairs, observed Mr. C. Pearce in a paper advocating that every farmer should

erect a blacksmith's shop on his holding. The necessary equipment should comprise a blower, an anvil (weighing about 1½ cwt.), a drilling machine, taps and dies, a small swedge block, a hack saw for cutting iron, tongs for flat and round iron, chisels, punches, hammer (about 2½ lbs., lewt. of bolts, nuts, and washers (various sizes), nails (assorted sizes), five or six pairs of horseshoes, 3 cwt. or 4 cwt. of flat and round iron, and a few bags of coal. It was often urged by farmers that they had no time for blacksmithing, but less time was consumed in the execution of repairs than would be necessary to take the implement to the blacksmith, wait whilst he repaired it, and then return with it. A blacksmith's shop on the farm would easily save the farmer £30 or £40 per annum.

AMYTON, June 13th.—Mr. T. N. Mills read a paper on fencing, in which he advocated the use of wood and iron posts alternately, 12 ft. apart. There should be six wires, the top two being barbed. The distances of the wires apart should be from the top as follows:—11 in., 8 in., 7 in., 6 in., and 6 in. Red gum was the best wood to use, with No. 8 galvanized steel wire, which was less prone to rust in the post holes. Another effective rust preventive was to bore the wire holes with a ½ in. bit, the bigger hole being less likely to clog with dirt. Iron T posts 1 in. in width were better than steel droppers, which were easily broken.

MORCHARD, July 15th.—After the business of the annual meeting Mr. J. W. Reichstein, discussing the question whether it was advisable in harrowing green crops to use harrows with sharp or blunt teeth, favored the sharp tooth harrow. Mr. W. Toop also favored the sharp tooth, and said that it should be as light as possible. Mr. McCallum said that he had harrowed green crops thick with small weeds, and obtained good results.

WEPOWIE, June 14th.—Mr. Pearce read a paper on "Threshing."

WIRABARA, July 15th.—After the business of the annual meeting two short papers were read by Mr. E. Hollitt, which were much appreciated.

## MIDDLE-NORTH DISTRICT.

### (PETERSBURG TO FARRELL'S FLAT.)

BOOLEROO CENTRE (Average annual rainfall, 15.83 in.).

May 12th.—Present: 15 members and two visitors.

CARE OF FARM MACHINERY.—When not in actual use, said Mr. J. M. Carey in a paper on the care of farm machinery, all machines or implements which had any woodwork in their structure should be kept under cover. The roof of the machinery building must be watertight, and enclosed on three sides, the open side facing south to avoid the summer sun. Where fowls were permitted to run at large the front of the building should be closed with wire netting. The wagon, tip-dray, &c., should be painted at least once every three years. The woodwork on the harvester and binder, especially the big wheel on the latter, if the rim were of wood, required painting with raw linseed oil or boiled oil every year after being put in the shed. Belts and all other leather work required a coat of neatsfoot oil annually. It was an excellent plan before starting the harvester to put the belts on and give them a liberal application of neatsfoot oil on the outside only. The belts gripped better with such treatment, and were less liable to slip. Harvesters or binders should be driven the same way as the drill had sown, for if driven across the drill marks on hard land it was severe on the machines, and nuts and other parts were more liable to work loose and fall off. All nuts should be kept screwed up tightly, and where there was any possibility of them working loose, they should be double nutted. Land to be cut for hay should be rolled, because it reduced the wear and tear of the binder, the condition of the land on which machinery was used having a great influence on the length of its life. It was a mistake to work with the chains of the harvester or binder loose, because they wore out more quickly. Oil should never be used on a chain, as it collected dust. Black lead soaked in water and painted on the chain minimised the wear. The crown and pinion of the harvester should be treated in the same way. It was advisable to purchase ploughs and cultivators from local manufacturers, because when they became worn or strained the man who made them was best fitted to mend them, besides adding improvements which lengthened their life. Drills should be lifted

with a jack each season before being used, and operated by hand to ascertain if they were running freely. Kerosine should be used freely to remove rust and oil which had become clogged in the bearings. All obstructions should be removed from the distributors, and kerosine used freely to clear away fertiliser where it had become packed. All wearing parts on any machine required oil or grease, and if that were attended to breakage and delay would be avoided and the period of its usefulness prolonged. Mr. R. W. Stanton, in the course of discussion, said that reaping against the drill was not only hard on the machine, but caused considerable waste of wheat. Mr. W. Whibley said that it was his regular practice to use oil on chains.

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GLADSTONE (Average annual rainfall, 16in.).

June 17th.—Present: 13 members and one visitor.

DAIRYING.—In dairying the first consideration was feed, observed Mr. R. A. Humphris, in a paper in which that subject was discussed. For early winter feed plenty of good silage and early green fodder, such as barley, were excellent. A suitable herd should be selected, and only good, tested animals should be purchased. If a cow produced 10lbs. of butter per week on good feed, she was worth keeping, but it was also necessary to take into account the period of lactation. He had obtained good results from the Shorthorn-Ayrshire, but he preferred them crossed with the Jersey. A cow should keep up a good supply of milk for 12 months unless heavy in calf. For a "town" cow he preferred the Jersey, which gave a fair quantity of rich milk, and was easier to keep than other breeds. The calf should be allowed to run with the cow for the first day, because it tended to prevent teat blindness, which, in his experience more often affected a cow two or three months after calving than when recently calved. For the dairy, Shorthorn should be used, because, if they proved unprofitable as milkers, they made good beef. A cow should be dried off at least one month before calving.

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PORT GERMEIN (Average annual rainfall, 12.84in.).

July 22nd.—Present: 15 members.

MUNGOOSE.—The Hon. Secretary (Mr. J. Stewart), in a paper, drew attention to the possibility of the introduction of this animal, and the likelihood of it becoming a pest. It was recorded as having caused considerable trouble amongst chickens in Western Australia. The writer then explained that the mongoose formed a well-defined group of small civet-like animals, with very long and generally uniform colored bodies and tails, and described the distribution of the species and various physical characteristics and habits. There was a danger, if it became acclimatised, of its developing a taste for lamb, and he therefore urged measures to prevent trouble in that way. Members generally agreed that strenuous action should be taken to prevent the introduction of such pests.

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REDHILL (Average annual rainfall, 16.79in.).

July 11th.—Present: 13 members and two visitors.

PROVISION AGAINST DROUGHT.—Mr. M. M. Coffey contributed a paper, suggesting the adoption of a scheme for the preservation of surplus fodder for use in times of scarcity. He expressed the opinion that there was sufficient fodder produced on the individual farms during the years 1910, 1911, and 1912, to have carried over the drought period of 1913-14 every head of stock that the farmers held, and that fodder could have been conserved and utilised at a very small cost. In the absence of that provision, however, the results were disastrous. The farmers, he thought, seemed to consist principally of two classes in the matter of preparing for periods of drought, viz., those who could not, and those who would not. With the idea of obviating a recurrence of the recent drought experience he suggested that the State should purchase hay, say at a price of £3 per ton in times of abundance, and sell it to stockowners in times of scarcity at say £5 per ton. That, he thought, would obviate a good deal of waste, would ensure a market for hay, and eventually result in cleaner crops being produced. The increased selling price would act as an encouraging factor for each farmer to conserve his own requirements.

## YONGALA VALE (Average annual rainfall, 13in. to 14in.).

July 21st.—Present: eight members and five visitors.

**LIVE STOCK ON THE FARM.**—Mr. A. F. Dempsey read a paper entitled "Live Stock on the Farm," in the course of which he advocated the use of a medium draught horse for farm work, and for a harness hack a cross between the thoroughbred and a roadster. The foals should be well fed during the growing period, and if allowed to run for three years before being broken in great advantage would be gained later on. Sheep should be kept with Merinos as the foundation, crossed with either Lincoln or Shropshire, and a good, useful lamb would result. More attention should be paid to sheep raising, and with a little hand feeding larger flocks could be kept. Cows also yielded a good profit, but they should be well fed. When it came to stable feeding he found that cocky chaff and bran with a solution of molasses gave the best results.

**BELALIE NORTH,** June 15th.—After the business of the annual meeting, there was a discussion on the pickling of seed wheat.

**BOOLEROO CENTRE,** July 14th.—Mr. F. D. Brooks, after the business of the annual meeting had been finished, read a paper on "Co-operation." In a long discussion the prevailing opinion was that co-operation amongst farmers would not be a success.

**BUNDALEER SPRINGS,** July 13th.—Discussion took place on the subject of fallowing, Mr. Jas. Laurie advocating working to a moderate depth, afterwards loosening the subsoil with a cultivator, working whilst the soil was damp, but not wet, and as early in the season as possible. The majority present preferred shallow ploughing or fallowing with a cultivator, by which method a better germination of seed was secured.

**HILLTOWN,** July 7th.—Mr. A. A. Lehmann delivered an address on "The Selection of Brood Mares for Farm Purposes." Discussion ensued, members generally agreeing with the views expressed in the paper.

**LEIGHTON,** July 13th.—Mr. A. D. McDonald read a paper on "Notes on Farm Stock." Discussion ensued, and it was generally agreed that it was advantageous to feed sheep from troughs when feed was scarce. On the question of borrowing implements it was considered that a small uniform charge should be made, which would assist in the upkeep of the implements loaned.

**MOUNT BRYAN EAST,** July 15th.—After the business of the annual meeting had been transacted a discussion took place as to the best method of preventing sheep being fly blown. Mr. J. Thomas (Chairman) said that the most effective method was to spray them with sheep dip. A discussion then took place as to the best means of catching wild dogs.

**WHYTE-YARCOWIE,** May 15th.—Mr. E. J. Pearce read a paper on "Book-keeping on the Farm," in which he advocated a certain amount of bookkeeping by every farmer if it were only for the purpose of making out income tax returns. If a diary were kept it would be very helpful. In a general discussion members agreed with the paper. On June 19th Mr. F. H. Lock read a paper on "The Need for Individual Economy." Mr. E. J. Pearce deprecated the waste of binder twine, which he thought should be made use of. Mr. G. F. Jenkins said he would like to find a market for petrol tins.

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## LOWER-NORTH DISTRICT.

### (ADELAIDE TO FARRELL'S FLAT.)

#### ANGASTON.

June 17th.

**OIL SPRAYS.**—"Practical results have shown that in the spraying of fruit-trees oil is very much more effective as an insecticide, and has more beneficial effects upon the tree, than kerosene," remarked Mr. George Sharp in a paper on "Oil Sprays." Experiments made on certain scale insects showed that it required a 1 in 10 kerosene emulsion to accomplish what a 1 in 40 oil emulsion would do. A probable reason for that was that kerosene was much more penetrating than oil, and instead of remaining on the surface of the tree or block-

ing the pores of the insect with a dense suffocating film, it soaked right into the bark. Oil remained on the outside of the bark, and its action continued for weeks after the spraying. In fact, the best work was often performed on the first hot day after the application, for it would then creep into crevices and corners, where it was impossible for the sprayer, were he ever so skilful, to force it. A heavy spray of oil on peach trees started twig growth right down to the fork of the butt, and pear trees, which were subject to a mysterious disease which caused the bark to crack and lessened the growth, eventually rendering the tree useless, had been treated with heavy sprays of oil emulsion, and the results had been very satisfactory. As an insecticide oil had great advantages over every other spray or gas, in that it killed every class of insect. There was no mite so closely hidden that it could not be reached, and no scale so well protected that it would not be penetrated. Spraying with oil had had the effect of causing trees to blossom a fortnight before trees which had not been treated, and it had also been noticed that trees treated with oil, at that time of the year, set their crop more heavily than unsprayed trees.

JULIA (Average annual rainfall, 18in. to 19in.).

April 29th.—Present: eight members and four visitors.

CUTTING HAY FOR HEADER.—The cutting of hay for the header would be of little advantage, on a small farm, said Mr. C. Nash, in a paper dealing with that subject. It required to be adopted on a large scale, which would mean co-operation among the farmers. Up to the present co-operation had not proved practicable, and the outlay in machinery was too great for a small farmer to cope with. The best time to cut for the header was when the straw was commencing to turn a golden color, because at that stage the sap contained in the straw was sufficient to ripen the grain. The binding should receive every attention, as the sheaves received a good deal of handling. After heading, the straw was a very valuable fodder for stock in periods of shortage, otherwise the straw required the addition of a fair percentage of seasonable hay. For heading purposes tough varieties of wheat were the best, otherwise there would be considerable waste of grain during carting and stacking owing to the temperature. Mr. T. Prior, discussing the paper, said that he had installed a thresher last season at a cost of £32 10s., and he erected a 20ft. elevator at an outlay of £8. He cut 50 acres of crop, and the balance was harvested. The returns from the thresher were slightly better than from the harvester, and he had 80 tons of splendid straw in stack. The stock ate readily the rough chaff from the header, preferring it to going into a fresh stubble paddock. Six men were necessary to work the thresher, and they kept two teams carting from the paddock. Their best day's work was eight loads of hay, yielding 50 bags of wheat. Threshing was slightly more expensive than harvesting, but he calculated that the straw in the stack did not cost him more than 8s. or 10s. per ton.

JULIA (Average annual rainfall, 18in. to 19in.).

July 15th.—Present: 11 members and five visitors.

ECONOMY IN FEEDING HORSES.—Mr. T. Prior deprecated over feeding horses. When a horse had been spelling, its digestive organs would be upset if it were put at once on full feed. It was better to feed sparingly at first, even if the horse were kept somewhat hungry, and the ration should be gradually increased. All coarse hay should be chaffed, as it would be noticed that the hard, dry butts were generally wasted. Sufficient food for the whole day should not be given at once or the horse would not do well. It was well to give the animal just as much feed at once as it would clean up. Horses would keep in good working order if fed with judgment, either on long hay, not too coarse, or wheaten chaff with pollard or crushed wheat. The animals should always have a spell for a week or two in the spring.

MINTARO.

July 15th.—Present: 28 members.

SHEEP ON A SMALL FARM.—A good sheep-proof six-wire ring fence with posts or droppers 8ft. or 9ft. apart was the first essential of keeping sheep on a small farm, observed Mr. H. Schunke in a paper on that subject. In the construction of such a fence he preferred wooden posts about 24ft. apart with two light iron posts between. It would be necessary to subdivide that area into small paddocks, but the

dividing fences need not be of a permanent nature, wire netting and stakes answering the purpose very well, and being very easily erected. Wire netting of the largest mesh would be satisfactory, but he preferred a 2in. mesh, because it lasted longer. Wooden stakes might be used, but, if unprocureable, light iron posts should be obtained. They should be placed about half a chain apart, and the netting should be tied to them top and bottom with binder twine if the fence were only required temporarily, but if for a longer period lacing wire should be used for tying. If large stock were turned into the paddock a barbed wire should be run along the top of the stakes. In determining what sort of sheep should be raised the farmer had to decide what market he proposed to cater for. It would not pay the small farmer to breed for wool, and the most profitable method was to fatten lambs for market. He preferred the large-framed, plain-bodied Merino ewe with a good fleece, long in the staple, and it would pay to buy good young ewes from some reputable breeder, the heavy fleeces at shearing time making up for any extra expense in the original outlay. Those ewes should be mated with a Shropshire ram—a good, robust animal, with plenty of bone. It would be necessary to have green feed ready for the lambs when they arrived, and a small paddock sown with barley would provide sufficient picking for the young lambs until there was sufficient grass. Another and perhaps better plan was to buy store lambs after shearing; in normal seasons they could be purchased at a lower cost than the farmer could breed them. For that purpose a small paddock would be required in which to keep them going until after the harvest, when they could be turned on to the stubble, and would soon fatten if the right kind of lamb had been secured. Even if cheaper at the moment, stunted or undersized lambs should not be bought, experience showing that it was best to secure good well-grown lambs which fattened quickly, and were eagerly competed for. Even on the smallest farm it should be possible to keep a few ration sheep, and a small paddock should be set apart for that purpose. After shearing a line of cull ewes not too old, might be picked up at the sales. The more produce grown on the farm fed to stock the better. If a large amount of produce were fed to sheep the soil was not being robbed or impoverished to anything like the extent which obtained by carting produce to market, which was in reality removing so much fertility from the soil, and it had to be replaced by superphosphates and other manures, thus incurring the double expense of carting produce to market and carting back manures. But if produce were fed to stock they could be driven to market and cartage saved. It was often more profitable to feed oats to sheep than to sell the grain at the price ruling. If that were done paddocks affected with takeall could be sown for oats, thus cleaning the land and providing a splendid lot of sheep feed. He would also grow Grey Dun field peas, which were the best fodder grown for fattening sheep. Mr. C. D. H. Wright considered that it was best for farmers to breed their own lambs, because those bought in the market might have had a check. Crossbred sheep were very bad on fences. Merinos, if bred from good stock, were the best. Mr. D. Kelly said that the present time was favorable for the breeding of as many lambs as possible. It paid to fatten sheep on hay, but it was difficult to feed to them, especially in wet weather, when they wasted a lot by treading it into the ground. It was better to feed them on chaff, using bag feeders stretched between trees or posts. Merinos were the best sheep for a small farmer to breed. Mr. R. Kelly found barley a very good feed for sheep. He had kept 30 Shropshires for six weeks on three bags of barley and plenty of water. Mr. A. Rowe said that peas could be successfully grown with oats, and they could then be easily harvested and fed to stock in the form of hay.

#### NORTHFIELD (Average annual rainfall, 19in.).

June 6th.—Present: six members.

HOW TO MAKE LAND MORE PRODUCTIVE.—Declaring that land could not bring forth continuously without strength and renewed strength Mr. D. Rowe, in indicating some methods by which land might be made more productive, emphasised the fact that land required nutriment, recreation and rest. Food could be supplied in the first place by a rotation of crops, such as barley, oats, peas or different kinds of wheat, and secondly by manures, of which farmyard manure proved one of the best foods for the land. There were different methods of applying the manure. When the hay crop had been taken off, a moderate dressing, covering the soil, without any bare patches should be applied. Then the ground should be ploughed lightly, just enough to cover the manure. After the first rain it should be harrowed and

*followed early in June, if there had been reasonable rains. Such a method would have a beneficial effect on the crops for 20 years or more. After the first crop, 70lbs. or 80lbs. of super. to the acre should be applied, and afterwards 1cwt. sown with the seed. The second method was to top dress the crop in the latter part of June, spreading the manure over the ground until the crop had been covered. That course would prove very beneficial to future crops. A third method was to spread a light coat of manure, when fallowing, and then sow 1cwt. of super. per acre with the seed. The last method was suitable to small holdings. A two years' bare fallow would clean dirty land if overrun with soursobs and other objectionable weeds. It would also insure a good yield in a dry season and prove beneficial for future cropping. Large holdings (not new country) might be farmed on the three years' system, that was—rest or graze one year, fallow the second year, and crop the third. After many years of cultivation a seven years' rest by grazing would prove very refreshing to the soil, especially if followed by good seasons. Mr. H. Galway found that farmyard manure and super. produced good results. He believed in the two years' fallow, but did not recommend it on small holdings. Mr. W. J. Dall doubled the profitableness of the two years' fallow in that district, where land was so valuable. He preferred skim ploughing to bare fallow, and with a light dressing of manure it would pay better to grow grazing crops. As an instance of the value of stable manure, he said that 28 years ago, in the North, he had given an unsatisfactory 15-acre paddock of rough land a heavy dressing of stable manure and the beneficial results were still plainly visible. Mr. Rowe, replying to arguments, said that the two years bare fallow paid best on small holdings. From an area of 20 acres, which was given two years' bare fallow, he realised as much as a neighbor garnered from 140 acres. In another case, from 47 acres, after two years' fallow, he secured results which equalled the returns which a neighbor obtained from 200 acres.*

#### TWO WELLS (Average annual rainfall, 16,36iu.).

June 19th.—Present: six members and one visitor.

FARM MANAGEMENT.—“Carefulness is the first essential in farm management,” was the maxim laid down by Mr. G. M. Gordon in a paper dealing with the management of the farm. All implements and machinery should be ready to use when required. The horses should have the best attention and care in regard to their feed, not only when working, but before that time arrived. When the work had been completed the implements should be cleaned and put away under cover. All fences should be kept in proper order. Stables should be erected to the south-east of the homestead, because the wind very seldom blew from that direction. Stable and implement sheds should be separate because of the danger of fire. Stables should be built of stone with iron roofing, which was as cool as straw, with proper ventilation. Trees should be planted around the homestead to improve its appearance, and they should be planted in the paddocks to provide shelter for stock. Every farm should produce its own hay, wheat, fodder, mutton, milk, butter, bacon, poultry, and eggs. Mr. H. W. Kenner said that all grease should not be cleaned from implements and machinery before being put away, but should be left on so that the dust and rust might be kept out. All machinery, however, should be well cleaned before being put to work. Mr. Pratt said that 500 acres could be kept in ideal order by the employment of one good man, but it was very difficult to keep 1,000 acres in order, even with three men.

MALLALA, July 12th.—Mr. A. V. Nairn read a paper on war, and said that the farmer's occupation should be a ceaseless war on such enemies as rabbits, foxes, sparrows, starlings, yellow star thistle, and the Bathurst burr. Members expressed the opinion that farmers should co-operate occasionally and spend a day in hunting up and destroying the various enemies.

ROSENTHAL, July 11th.—Mr. G. Quinn, the Government Horticultural Instructor, delivered an address on “The Principles Underlying Pruning of Fruit Trees and Vines.”

SALISBURY, July 4th.—A visit was paid to the Parafield Poultry Station, and then a meeting was held, at which formal business was transacted.

TWO WELLS, July 15th.—After the business of the annual meeting Mr. Valentine (Victoria) delivered an address on dairying. He said that milking machine would not spoil the milking cow if properly used. Cows of his which had been



*milked with the machine for five years had not deteriorated in the least. The machines could do no harm if properly used, and those people whose machines had not been a success had not given them the proper attention.*

## YORKE PENINSULA DISTRICT.

(TO BUTE.)

DOWLINGVILLE, July 14th.—Members discussed whether the plough or the cultivator was the better implement for working the fallow. The majority favored the latter in that district, because it covered the ground more expeditiously, and the land was not so liable to drift after the cultivator, because it left a rougher surface.

## WESTERN DISTRICT.

GOODE (Average annual rainfall, 12in. to 13in.).

May 17th.—Present: nine members.

WATER CONSERVATION.—In a paper on the best method of conserving water Mr. W. Burner recommended the construction of tanks with solid walls of masonry. The so-called concrete tanks were chiefly composed of dirt and lime, and repairing and tarring were a constant necessity. He advised every farmer to be his own mason, no great skill being required to build a solid wall of limestone. The first tank for an amateur to essay should be a circular one, because by using a trammel in the centre he could keep his work in order. If he built to the trammel he could not go wrong. To set out a round tank 16ft. in diameter, a round pin should be driven in the centre of the site, and a piece of wire 8ft. in length attached to it. With that a circle could be drawn, which would give the circumference of the tank. In excavating the tank should be kept perfectly vertical. Before commencing to build the bottom should be thoroughly rammed, in order to give a solid foundation for the wall. Care should be taken that the first course of stone went right through the wall, and was faced up carefully to the trammel, because a correct beginning would avoid considerable trouble. The mortar should be composed of two parts sand and one of lime. It was essential to keep the face of the work clean, and not cover it up with mortar, which should only be used to stop up joints. The cement should have a clean, solid face to adhere to, and when once it set to the clean stone, nothing would remove it. In building, the stone should not be edged and the hard, flinty face should not be turned with the face outwards, as the cement would creep, and come away, leaving a hollow patch. When bedding stone, the tail should not be propped up with mortar, but spalled up with flat pieces. Everything should be put down solidly with the hammer, and the lime should be screened.

## MOUNT HOPE.

July 21st.—Present: seven members.

CARE OF HARNESS.—Only the best harness should be bought, declared Mr. H. J. Myers in a paper on that subject. It would cost more, but it was cheapest eventually. Special care should be taken to see that the collars fitted well. A closely-fitting collar would last longer than a loose one, because there was less wear and tear. Each horse should have its own harness and a separate peg should be provided for each horse's collar and blinkers. A good harness room was an essential. If the room were free from dust, and the harness were oiled twice a year, it would last a lifetime. Frequently he had seen the collars left on horses when they were feeding, but that was a mistake because it had the effect of irritating the animals and damaging the collars. Back bands were usually left in the paddock with the implements, and required a liberal application of oil to keep out the wet. Discussing the question of poultry, raising Mr. J. Winstanley said that White Leghorns were the best egg producers. He preferred barley to wheat as a food for fowls, because it was not so fattening. Mr. R. Myers said that it would pay farmers to feed a larger proportion of their crop to poultry. Chicks should be hatched in order to lay early, and catch the winter egg market. Mr. T. Speed said that fowls should be given soft mash in the morning and hard grain in the evening.

PENONG (Average annual rainfall, 11.93in.).

June 10th.—Present: seven members and one visitor.

BLACKSMITHING ON THE FARM.—Economy and convenience were the two leading points urged by Mr. J. Oats in his paper "Blacksmithing on the Farm." He urged that a blacksmithing outfit not exceeding £15 or £20 in value, would provide all that was necessary. Many repairs could be effected on the farm in a few minutes if the appliances were at hand. Possessing necessary equipment, it would often be more economical and convenient to bring the blacksmith to the farm, instead of taking the work to him, especially when there were many horses to be shod. Small bellows were a mistake, and he recommended a 36in. size. An anvil (not less than 1cwt.), an upright drill, a good heavy vice, and taps and dies were essentials in a farmer's blacksmithing outfit. A few lengths of assorted sizes of round iron, for making bolts, and a few bars of flat iron of the sizes in use on the implements for repairing purposes, should be kept in stock. Mr. W. Saunders considered blast furnaces more powerful, and less likely to get out of order than bellows. Mr. W. Place preferred the blast furnace, though the cost was double that of bellows.

PENONG (Average annual rainfall, 11.93in.).

July 9th.—Present: five members.

FARMING.—Success in farming mostly depended upon the farmer and the nature of his plan, postulated Mr. W. L. Place, in a dissertation on farming. Land which was recognised as old land should not be cropped, he said, more than two years in succession, but about four crops might be taken from new land. The fallowing of grass land, which had rested for two or three years, was preferable to fallowing the previous year's stubble. By ploughing in green herbage humus was being put into the soil, but, in ploughing in stubble, there was a tendency to permit the moisture to escape. A commencement should be made with fallowing about the middle of July, and it should be finished at such a time as the nature of the season suggested. Sheep were profitable on the farm as they could be kept on the land whilst fallowing was in progress, and, when that had been completed they helped to keep down the rubbish. Merino sheep were best, because a five wire fence was sufficient to keep them in. Large iron sheds provided the best catchment areas for water. Four such structures, each 60ft. x 30ft., would, with an average rainfall, conserve enough water to provide for the dry spells. Tanks of about 120,000galls. capacity would be ample for the amount of roofing indicated. With such an equipment, there would be no danger of floodwaters filling the tanks, nor would they be exposed to the menace of drift sand. Every farmer should raise his own horses, the class he preferred being a cross of the Suffolk Punch and Clydesdale, because they were very active, and possessed the requisite weight. Cows, pigs, and poultry should always be kept, because they provided dairy produce for the home, and something over for the market if managed in the right way. Mr. O. J. Murphy considered that surface tanks were necessary as well as roof tanks. Iron roofed sheds, with iron or cement tanks were advisable in new areas in preference to surface tanks, especially in sandy country. The best water runs could be chosen after the tracks had been made, and a portion of the land cleared when surface tanks could be put down.

YANINFE.

June 17th.—Present: six members and three visitors.

FERTILISERS.—Mr. Cook (Manager Experimental Farm, Minnipa) contributed the following paper on this subject:—"The use of artificial fertilisers is to-day practically general throughout countries with advanced agricultural methods, and is adopted as a means of enriching soils in the various foods for plants. Grains, livestock, food, &c., sold off the farm remove a certain proportion of substances from the soil, and it is to make good these losses, or removals, that fertilisers are applied. In some countries, as in parts of this State, soils are found that doubtless are very rich in many plant foods, but in one or more particular types of essential foods they are very deficient, so much so that certain crops that require these particular classes will not produce payable results unless recourse is had to fertilisers. It behoves farmers not merely to produce a first class crop, but to look well ahead, so that the land will always be in the condition to produce first class crops, and to do this we must always aim to keep the soils enriched,

and necessarily adopt a comprehensive use of fertilisers, together with adequate tillage methods. As good tillage is looked upon as having fertilising capabilities of no small order, we must on no account ignore any cultural methods, and put too much reliance on our applications of fertilisers, as the one operation is the complement of the other. There are 10 essential elements that enter into the tissues of plants, and are contained in practically all varieties of plants in varying quantities according to the species of plants. For instance, cereals contain a relatively higher proportion of phosphorus than other plants; potatoes and onions contain a greater proportion of potash, turnips a larger percentage of sulphur, and clovers a larger amount of lime or calcium. The 10 essential elements of plant growth are carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus, potassium, magnesium, calcium, and iron. Other elements, such as sodium, silicon, and chlorine are generally found in plants, but they are not essential to their growth. Of the essential elements, all but the first mentioned are obtained by the plants from or through the soil, and it is these that we need to have in an available form and in close proximity with the plant's roots. Hydrogen, oxygen, and nitrogen come from the atmosphere, and it is cultivation that materially helps to supply these. Nitrogen is fixed in the soil by bacteria, and a climate such as we enjoy is very effective to the life of these organisms, so that, unlike very wet countries, we shall scarcely, if ever, need to apply artificial nitrogenous fertiliser to our crops. Our nitrogen supply we must look at indirectly and husband a good supply of humus in the soil as food for bacteria. For this there are a number of points to observe, but space will not permit of their discussion in this paper, suffice it to say, that it is as well to look upon all fires, scrub or stubble, as necessary evils. With regard to the other six elements, namely, sulphur, phosphorus, potassium, magnesium, calcium, and iron, or ash constituents of plants, these are found in varying proportions in practically all known soils, but in various compositions and stages of availability for use by the plants. In fact, iron, magnesium, and sulphur are found in such small quantities in plants that practically never has it been necessary to apply these to a soil, our cultivations being the means of sweetening the soil and providing these elements in sufficient available forms, that is, forms that are readily dissolved by the soil moisture, and are thus able to be utilised by crops. With regard to calcium or lime, this is usually in sufficient quantity in soils to satisfy the plants as food, but it is frequently found necessary in some lands to apply it as a means of rendering other elements into available plant food forms. In this district it is highly improbable, except in perhaps a few isolated cases, that we shall even need to consider this element as being in insufficient available quantity. Potassium is present in most South Australian soils in sufficient quantity, and in districts like this, where lime is not wanting, it can usually be had in sufficient available form for the growth of most crops. At any rate, for the present, it is not one that we need to consider. Lastly, we come to phosphorus, and this is the one that affects us, as wheatgrowers, at the present moment, and that I purpose considering in some detail. Most soils lack a sufficiency of phosphorus, and this is especially so in Australian soils, as reports from all experimental fields in the Commonwealth denote a marked payable increase in yields by the application of phosphatic fertilisers. With regard to our own district soils, to my knowledge, no analyses have been made of them, but Mr. Jack, the Assistant Government Geologist, in his geological report of this country, publishes analyses by Mr. Chapman, Departmental Analyst and Assayer, of the various granite outcrops and felspar porphyries of the Gawler Ranges, from which our soils have been formed. On perusing these we notice phosphoric anhydride is present in the rocks in varying quantities from .04 per cent. to .09 per cent., so we can safely expect our soils to be rather poor in phosphorus. A soil that contains .1 per cent. of phosphoric anhydride, i.e., 1lb. in 1,000lbs. of soil, or 3,250lbs. per acre, is considered rich in phosphorus, whereas one that contains less than .05 per cent., i.e., 1lb. per 1,000lbs. of soil, or 1,025lbs. per acre, is considered poor in phosphorus. Of the supply of phosphoric anhydride in a soil, we can reckon on no more than one-tenth being immediately available to plants. From the above figures it behoves us to foster our phosphorus supply and endeavor to apply sufficient phosphate fertiliser to make good the quantities of phosphorus removed from the soils in produce. Undoubtedly, there is some available phosphorus present in the soils, but a good farmer would tend to increase rather than deplete this supply, and it is

only by actual practical experiments that the most payable application can be decided, and it is well for every farmer to experiment on these lines. Let us consider phosphatic fertilisers under the following headings:—(1) The value of various types on the market, and hence the best quality phosphatic manure to apply; (2) quantity to apply per acre; (3) when to apply. (1) With regard to the quality of phosphatic manures, quite a large number of brands and classes are advertised and put on the market by the various firms as superphosphates, bone supers., bone dust, guanos, slags, and a host of special manures. The quality of these is ascertained by their chemical composition, which we usually find nowadays branded on the bags as so much per cent. water soluble phosphate, so much citrate soluble, so much acid soluble, and possibly a small quantity of nitrogen or potash is also claimed to be present in the manure. These terms of different classes of phosphates are the recognised commercial terms adopted for the sale of these manures; but, strictly speaking, they signify the quantity of phosphate rock rendered soluble. For instance, consider a superphosphate advertised as containing water soluble phosphate, 30 per cent.; citrate soluble phosphate, 2 per cent.; and acid soluble phosphate, 3 per cent. This means that 30 per cent. rock phosphate or acid soluble phosphate has been rendered soluble in water, and 2 per cent. of rock phosphate has been rendered soluble in a weak acid solution, such as citric acid, whilst 3 per cent. of rock phosphate remains practically untreated chemically as crushed or powdered rock phosphate. Of these three forms of phosphate, the first, water soluble, is of most value to us. A beneficial result has been obtained with the other two forms in wet countries, such as New Zealand; but in drier countries, especially where soil contains plenty of lime, the water soluble form is much more beneficial. The chief reason of this is that the water soluble is more readily available for use by the plants, whereas the less soluble phosphates have to be further acted upon by weathering actions, and by the weak acids of the soil before they are of use to plants as food. Further, these forms of phosphates are constructed of the element calcium, and the phosphoric acid anhydride. The acid soluble phosphate consists of three parts calcium to one of phosphoric anhydride, the citrate soluble consists of two parts calcium, and the water soluble consists of one part calcium to one part of phosphoric anhydride. It is obvious from this that the water soluble form suits us better, as our soils already contain fair quantities of calcium, and it is, therefore, inadvisable to fetch more from other parts, and at the expense of phosphate which we need. Hence the superphosphate containing the largest quantity of water soluble phosphate at the lowest price, provided it is free running, is the one that would pay best to secure for this class of country. Let us instance one or two manures on the market, and compare their actual phosphate values. Firstly, the one referred to above and advertised as a special hay manure: 1 cwt. of this manure contains approximately 17½ lbs. phosphorus, 15 lbs. immediately available to plants and 2½ lbs. not at first available. For this, together with ½ per cent. nitrogen, the vendors ask the price of £4 17s. 6d. per ton, or 3.3d. per lb. phosphorus. Ordinary 38 per cent. mineral super. contains only water soluble phosphate, and 1 cwt. contains approximately 19½ lbs. phosphorus, the price of which is £4 5s. per ton, or 2.7d. per pound phosphorus. Of late years higher per cent. water soluble phosphate supers. have been on the market, reaching as high as 45.47 per cent.; 1 cwt. of such would contain approximately 23½ lbs. phosphorus anhydride, and price asked was £5 per ton, or 2.6d. per pound P<sub>2</sub>O<sub>5</sub>. Undoubtedly the last is the cheapest, provided the super. runs freely through the drill, and 90 lbs. of it is equal to 1 cwt. of 36.38 per cent. water soluble phosphate super. This means a large save in freights, and affects the farmers on this Peninsula more than perhaps on the mainland, and farmers should consider a position where freight is reduced by one-fifth, and be better advised to spend the one-fifth thus saved in the extra purchase of phosphate. It is unfortunate that for every pound of phosphorus we give our soils we necessarily also have to import and apply 4½ lbs. of other substances; but this is the most economical method at present within our knowledge. (2) In considering the quantity to apply per acre for the wheat crop we can but discuss the phosphatic requirements of wheat, and also consider results obtained in other parts of the State and Commonwealth, until such times as we have experimental results in our own district. Professor Perkins, in an interesting address some time ago, quoted that a 20-bush. crop of wheat would absorb 18.9½ lbs. phosphoric anhydride per acre, and that 1 cwt. of 36.38 per cent. super.

contains 19lbs. phosphoric anhydride, therefore 1cwt. 36-38 per cent. super. puts into the soil sufficient phosphorus for a 20-bush. crop of wheat. From this we see that to keep our soils well supplied 1cwt. dressing per crop of 36-38 per cent. super. will not be too much, as we all hope to produce at least 20-bush. crops. The average dressing for the State of South Australia of late years has been about 80lbs. super. per acre. At Roseworthy, Professor Perkins, over a period of 10 years demonstrated that 2cwt. super. dressings per acre gave the best return; but this was gained by the increased sheep carrying capacity of land as well as by the grain products. At Saddleworth, over a period of 11 years, Mr. Coleman has shown that 1cwt. of bone super. gave an average annual value increase of £1 12s. 8d. over no manure, and 1cwt. mineral super. gave an average annual increased value of £1 8s. 7d. per acre over no manure. In Victoria at three experimental stations, over a period of the last three years, the average net profit gained over no manure for 1cwt. super. application is 16s. 6d. per acre; for 1cwt. super. £1 0s. 8d.; and for 2cwt. 17s. per acre. This is for wheat crop alone. New South Wales also reports good results from super. applications, and notice in their dry low rainfall Western district they use rather light dressings of super., down to as low as 37lbs. per acre; but this is in very light rainfall country, and where crops rarely exceed a 10-bush. average. (3) When to apply.—By applying super. with the wheat seed it undoubtedly gives it a good strong initial growth, and this is very important, as a good start means a lot. The root hairs have not to hunt for their phosphate, but have it close at hand, and are, therefore, able to get well to work on the super., so long as there is sufficient moisture in the soil. Any method that tends to hasten growth is an advantage, as our summers are so liable to set in early, hence do all to keep sufficient available food in sufficient proximity of the roots of our crops." A number of questions followed the reading of the paper. The objection to burning stubble, Mr. Cook explained, was that it destroyed humus. No harmful effect should follow the application of 1cwt. per acre dressings of superphosphate in that district. Early wheats would be found most satisfactory. He advised grubbing the stumps in preference to allowing them to remain in the ground. Ploughing should be to a depth of 2in. or 3in. if the seed were sown directly afterwards; but on no account should the depth of ploughing exceed 4in. or 5in. In the event of a crop being sown with a fair dressing of super. and failing, it would not be necessary to dress the land with such a large quantity the succeeding season, as the value of the first dressing was not lost.

#### YANINEE.

July 15th.—Present: 11 members and three visitors.

FENCING.—In a paper setting out the best methods of fencing, Mr. C. C. Tainsh said that in that district there were four classes of timber which could be suitably used for posts, namely, titree, king mallee, pine, and bullock. Titree posts would last the longest, but pine or bullock made a neater fence. Posts should be 5ft. 8in. in length, 3in. in diameter at the top, and should be set 1ft. 8in. in the ground. Straining posts should be set 3ft. in the ground and rammed well. Corner posts should be sighted a little out of the line to allow for pulling in. A stay or a strut about 8ft. in length should be used for the straining post. One end of the strut should be bedded in the ground about 8in., and the other end let into the straining post, not more than half-way up. If it were put in more than half way, the strain of the wires was likely to lift the straining post up, especially when straining up hill. Sight sticks should be about the same height as the fence, and not too far apart. If the fence were for horses or cattle three wires were needed, two barbed, and one plain, the latter being at the bottom. The top wire should be about 2in. from the top of the post and all the wires should be about a foot apart. Wire should not be overstrained, because it would not keep tight, and was easily snapped. The longer the strain the better, as it diminished the tendency to overstrain, and would keep the wire much tighter than a short strain. In fastening up the wire it was best not to fasten with wire around the posts, but to use good strong staples, which should not be driven in too far, always leaving room for the wire to run easily through them. If wire were fastened firmly to the posts and stock happened to charge it, the wire would snap, but if left to run free it would give with them at first, but the recoil would throw them back again. For sheep-proof fences the posts should be 12yds. apart with three wooden droppers between. The droppers should swing clear of the ground, the posts should be bored, and the wires fastened

to the droppers with staples, allowing the wires to run free. Six wires, five being plain and one barbed (on the top) would make a very good sheep fence.

**MIXED FARMING.**—On a moderate scale mixed farming was a profitable, and in most cases, a reliable pursuit, premised Mr. H. T. G. Dunn, in discussing that aspect of agriculture. Financially, and in the matter of comfort, the adoption of mixed farming was ahead of the growth of wheat and other cereals. Wheat should be grown for the production of wheat only, that was to say, that the proceeds of the grain should be used for procuring the necessary appliances, such as implements, fencing material, and other useful and necessary articles required by a farmer. The produce of the livestock should almost, if not completely, supply the household requirements. Where possible, no farm should be without 50 or 100 sheep, or even more, where conditions would allow. The killing of a sheep occasionally meant pounds in the pocket of the farmer, as it did away with the meat bill, a serious consideration at present rates. In addition to that there were the lambs and the wool to be considered. The number of sheep to be kept on a farm should be determined by the quantity of water available. All the water possible should be conserved in order to provide for the stock when dry spells came. When there was a failure of the wheat crops the wool and meat of the sheep would come to the rescue, if ever so little. There was also the consideration that sheep running on the land enriched it, and they likewise kept down and destroyed a large percentage of weeds. He preferred Merino sheep, which were easy to manage, fairly hardy, and if not so weighty in carcass as other breeds, their wool was of a better quality. Cows were almost as necessary on a farm as horses, because, in addition to provisioning the table to a large extent, the spare milk could be invested in putting condition on the pigs. Surplus butter could be exchanged for stores which the farm could not produce. It was not advisable to keep more than two or three good cows for the milk and butter supply. He preferred the Jersey or Alderney breed crossed with the Shorthorn. A couple of good breeding pigs of the Berkshire-Tamworth cross were all that was required for supplying pork, and at least 100 fowls should be kept. He was averse to raising horses for market, but to breed for home use was most advisable. He preferred a medium active horse to the pure draught stock, even though an extra horse or two might be required to draw the same load as the heavier horse, because generally the work would be carried through in less time and with less trouble to the team.

#### YEELANNA.

June 17th.—Present: eight members.

**BLACKSMITHING ON THE FARM.**—In the mallee land of that district there was a great deal of strain on the implements, owing to the prevalence of stumps and stones, said Mr. J. Carey, in a paper advocating that farmers should be their own blacksmiths, and therefore it was convenient and economical for the farmer to do his own work, instead of running to the tradesman for every minor repair. The forge should not be erected in the open, as blacksmithing was usually a wet day job. He recommended that the blacksmith's shop should be 20ft. x 16ft., and certainly not less than 16ft. x 12ft. An old 200gall. iron tank cut in half made a very good forge. Iron legs should be used, but failing that, four pieces of 3in. x 3in. jarrah would make good uprights. Blowers, though more expensive, were more effective, and occupied less room than bellows. The anvil should be set perfectly level on a solid block. It was necessary to have a drilling machine and a set of stocks and dies. A small stock of bar iron in sizes from ½in. to 1in., or even 1½in., should be kept for making eyebolts, C hooks, S hooks, and various repairs. A complete shoeing set was also a necessity. He recommended the provision of two benches, and shelving to accommodate the various tools and articles which necessarily found a place in a blacksmith's shop.

#### YABMANA (Average annual rainfall, 15.14in.).

July 15th.—Present: nine members.

**FALLOW.**—By the end of August fallowing should be completed in time to work the land thoroughly free from weeds before harvest, stated Mr. H. W. Schumann in a dissertation on fallow. The land should be ploughed from 3½in. to 5in. in depth according to the class of soil, shallow treatment being given to sandy soil and a depth of at least 5in. to loamy land. Any ground which had a tendency to drift should be left in a rough state. It should be cultivated to a depth of 3½in.

and each subsequent working should be shallower. Fallow could not be worked too often, and it should be worked after every fall of rain. If weeds grew after the spring rains, and the farmer was busy haymaking, a flock of sheep might be turned into the fallow to prevent the weeds from seeding. A cultivator or a skim plough without mouldboards would be found most suitable for working fallow land. Whilst endorsing the principle of early fallow, Mr. W. Doney said that late fallowing was preferable to none at all. Mr. J. F. Robertson pointed out that it entailed much more work to keep land fallowed in June and July free from weeds than if August or September were selected. Land fallowed in the latter months required no working other than harrowing, because the weeds would be killed by the ploughing, though he had grown excellent crops from land fallowed after all the weeds were out in seed. Mr. J. H. Frost would fallow early, before the weeds had seeded, and he would plough to a depth of 5 in. In that district land which had been cropped the previous year would produce a crop the second year if the land were ploughed after the stubble had been burned and then reworked before sowing. Land should be fallowed when it contained a sufficiency of moisture, which in some years, was very rare. Mr. A. Sehmunn advised varying the depth ploughed. If land were ploughed the same depth year after year, a hard, smooth sub-layer would be formed, and the roots of plants would follow along that instead of going down. The fallow should be worked in the spring to the depth that the land had been ploughed, and in the seeding time just deep enough to cut the weeds. Mr. H. P. McCallum said that deep ploughing was satisfactory where the rainfall was good, but in the dry country it had a tendency to cause the crop to blight, and encouraged takeall.

BUTLER, June 12th.—Mr. G. Parker read a paper on poultry keeping on the farm, and said that farmers should pay more attention to it. The cost of keeping 70 head of poultry had been £5, and the return was £28 6s. 9d. for 546 dozen eggs sold, in addition to the eggs used on the farm. In the course of discussion the opinion was expressed that fowls should be given free range, because the more they foraged for themselves the more healthy they were.

CUMMINS, July 15th.—This was the inaugural meeting of the Branch, and when the officers had been elected and the formal business transacted Mr. J. Sabey read a paper on "Co-operation," which he explained was a working together for the good of all. In a discussion which ensued the principle of co-operation was upheld.

ELBOW HILL, July 15th.—After the annual meeting Mr. A. O. Dawkins read a paper entitled "Dairying on the Farm." Discussion followed, in which it was stated that in that district dairying under existing conditions was more profitable than wheat growing.

GOODE, July 12th.—Discussion took place on the possibilities of live stock. Mr. W. Lavish said that if paddocks left out of crop were sown over for feed, three head of stock could be carried where one was possible at present. Straw and cocky chaff should be stacked for emergency feed. Mr. W. Morcombe said that with abundant water a lucerne patch should be maintained which would keep stock in health. Mr. W. Folland estimated that with abundance of water the large and small stock on the farm could be increased by one-third.

GREEN PATCH, July 10th.—After the annual meeting Mr. C. J. Whillas read a paper on "The Bulk Handling of Wheat," which evoked considerable discussion.

KOONIBBA, July 13th.—A discussion took place on the bulk handling of wheat.

## EASTERN DISTRICT.

### (EAST OF MOUNT LOFTY RANGES)

#### BORRIKA.

June 10th.—Present: 23 members and 11 visitors.

ADVANTAGE OF THE COMPLETE HARVESTER.—Very definite was his conviction of the advantages of the complete harvester over the stripper, set out by Mr. E. H. Huxtable in a paper on that subject. The advantages, he said, were too great to be overlooked at the present time, when labor was so scarce. One man with five

horses and a six-foot harvester could deal with 100 acres of oats and 300 acres of wheat. The oats would be finished before the wheat was ready. Compared with the extra cost of handling, etc., entailed by the use of a stripper, the difference in the price of a harvester and a stripper need not be considered. Work with the harvester was also much more pleasant than dealing with the wheat heaps of the stripper. The work could also be done more quickly, thus affording more time to prepare everything for an early start with seeding, which might mean a considerable sum in the succeeding harvest. The waste of wheat upon the sandy floors involved in the use of the stripper was avoided by the harvester. With a stripper it was necessary to make many wheat heaps, which necessitated the shifting of the engine, winnower, etc., whereas the harvester made heaps of 30 bags, which, when sewn up, were ready for market, and if the weather proved unsuitable for harvesting, they could be carted away at once. The harvester worked more easily than a stripper over heavy country, because it was fitted with wider wheels and had a more direct draught, owing to the arrangement for depositing the wheat on the near side. Mr. Penfold agreed with the paper. He had never used more than five horses in the harvester, and for the first 400 bags he had used only four. All his land was new. Hay was a cheaper feed than cocky chaff, because grain had to be added to the latter to provide the necessary nourishment. Mr. V. V. Brown (chairman) said two years ago he had fed his horses on cocky chaff and pollard, at a cost of 7s. per horse per week. Mr. J. B. Tonkin had found the harvester heavy on the horses and had converted it into a stripper, which proved very light in draft, and he worked it with three horses. In reply to a question, Mr. Huxtable said that he saved enough cocky chaff for his requirements with the harvester. Mr. Hart found cocky chaff cheap, but preferred hay, when he could grow it. Mr. Jones said he had saved a number of young horses during the drought by having stored cocky chaff to give them, and they did very well on it.

#### CLAYPAN BORE (Average annual rainfall, 16in. to 17in.).

July 10th.—Present: five members and one visitor.

**PIG RAISING.**—The raising of pigs on a large scale was an operation which he had found rather unsatisfactory and very troublesome, remarked Mr. C. L. Dunstan in a paper on the raising of pigs. In the first place, fencing and shelter accommodation were expensive, and the land required to produce abundant feed to provide sufficient to enable pigs to be profitably raised, and it was doubtful whether the profits in 10 years would recoup the fencing outlay. He had tried growing rape, kale, turnips, beet, barley, peas, lucerne, clover and wheat for pigs' food, and wheat and barley alone proved worthy of consideration. There was not sufficient rainfall to depend on anything but cereals. On some of the heavy soils on the flats in wet years it might pay. The pigs should be run on firm ground, because it was possible to make the fences more secure than in sand. A superlatively strong fence was required to retain pigs, and barbed wire even was not effective. Pigs kept on the farm in such numbers as to use up waste products, skim milk, &c., were profitable if kept in a strong sty, but he was adverse to large paddocks, because the country could not be depended upon to produce feed all the year round. Wheat, when cheap, might profitably be fed to pigs, and it would pay to strip barley and feed it either crushed, boiled, or soaked, but the growing of barley had the disadvantage that it was difficult to keep the land clean for wheat afterwards. Oats used in that way would be more satisfactory. Both the Berkshire and the Berkshire crossed with the White Yorkshire proved a very good pork or bacon animal, as required. Some breeders preferred to cross the Berkshire boar on a Tamworth or Poland China sow, and then breed back again to the Berkshire, the object being to obtain a larger class of bacon pig, with longer sides and more prolific sows, and diminishing as little as possible the qualities of the Berkshire. Summing up, he answered in the negative the question whether it would pay to raise pigs extensively in paddocks, because fencing was too expensive, the animals were too troublesome, the country too new, and the rainfall insufficient. Mr. E. Colvill said that the reason pigs got out of their sty was that they were insufficiently fed. A good sty could be built of five barbed wires and mallee roots. Sows should be turned out into a small paddock until farrowing time. Breeding in hot weather was inadvisable, and the young pigs should be castrated when with the sow. He preferred the White Yorkshire breed. Mr. S. Gray favored the Berkshire breed, using only the best bred boar. Mr. Webb said that the most profitable



scheme was to run pigs in small paddocks and feed them at night if necessary. He preferred the Berkshire-Tamworth cross. Mr. G. R. Small said that no wire netting was strong enough to retain pigs, which would break through almost anything unless properly fed. Mr. J. Gray considered running pigs in a paddock the most profitable proposition. The sows and young should be running until six or eight weeks old, and then the young should be housed and fed until fit for the market as porkers, when they were generally most profitable. One year he had been able to sell pork at 3d. per lb., feeding them on wheat at 3s. per bushel. Oats and pollard made an excellent feed. The pig yard should be roofed throughout, or it could not be kept dry. He preferred the Berkshire breed.

FORSTER (Average annual rainfall, 16in. to 11in.).

July 22nd.—Present: five members.

HOW TO MAKE FARMING PAY.—In that district, said Mr. W. E. Towill in a paper which dealt with the question how to make farming pay, wheat growing alone was not profitable, owing to the paucity of the rainfall. For five years out of 10 the returns did not pay expenses, and labor could not be profitably employed for that reason. It was necessary, therefore, to look to something else besides wheat growing. More fowls, cattle, and pigs should be kept, especially the latter, owing to the price of pork, which was likely to be maintained for some time. To make a profit which was worth having from fowls about 200 birds should be kept. If the stock of cattle, pigs, and poultry were increased, the farmers should see that there was a good supply of food for them before selling their wheat. The best results were obtained from feeding everything well. He had found that it paid to give fowls as much food as they could eat, with plenty of variety, ample shelter and abundance of clean water. Mr. C. W. Towill recommended fallowing whilst there was plenty of moisture, also scrub rolling for those who had it, and the planting of fruit trees. In reply to a question which was raised members advised cutting almond trees back in the centre to prevent them growing too high. Fig trees did not require pruning; it was only necessary to cut the suckers back. Mr. W. Seale said that care was necessary with poultry keeping on a large scale, as fowls were subject to disease, and needed a large amount of attention.

LAMEROO (Average annual rainfall, 16.55in.).

July 15th.—Present: 18 members.

FALLOWING.—As soon as possible after seeding fallowing should be commenced, urged a member in a paper on "Fallowing," and it should be finished before the end of August, in order to conserve as much of the winter rains as possible. The plough should be set so as to cut all the ground and throw the furrows evenly. The draught should be put on to root up as many stumps as possible. The soil in that district varied in character considerably, and the depth of ploughing should be regulated accordingly, whilst the plough was in motion. Heavy clay soils should be ploughed to a depth of 4in., red loamy soil about 3in., and light sandy soil 2in., the latter being only just skimmed with the plough. He would drill in some oats and about fewt. of bonedust to the acre on sandhills about March in the paddocks which were to be fallowed the following winter, thus providing a few extra acres of good feed for the sheep. Sheep assisted in manuring and consolidating the ground, which, with the addition of the bonedust, yielded better results the following year than if fallowed and allowed to drift away. Harrows should not be used to work the fallow because it would be more likely to drift. He preferred cultivating twice over after the ploughing, and cross working it each time where possible. Cultivating should be done before the fallow became too dry, and if rubbish grew after that the sheep could deal with it. The teams should not be put on the fallow again until seeding time, unless very heavy rain fell, when the spring tooth cultivator should be kept going until the fallow was dry. Just before seeding the harrows should be put over the ground once, because that would give the weeds a better start. Cultivation for seeding should be as shallow as possible and wide shares should be used in order to destroy the weeds. Mr. E. J. Trowbridge preferred to use the harrows and then to cultivate. Mr. Campbell said that fallowing deeply on sandy soil would greatly improve it. Fodder growing for green manuring would also improve the land. Mr. A. J. A. Koch said that land should be fallowed 3½in. to 4in., and heavy ploughs should be used to remove as many stumps as possible. Mr. F. W. Elme said that early fallowing was a great

success in dry years. It should not be more than 2in. deep, and he would then harrow and cultivate. Mr. G. Hayman said that fodder growing and keeping sheep would pay better than fallowing.

#### McNAMARA BORE.

May 7th.—Present: six members and two visitors.

THE MALLEE FARM.—For clearing the land on a mallee farm, where the mallee was a fair size, Mr. F. G. Williams, in a paper on the mallee farm, recommended the roller. Where the scrub was small the roller was not so good, because it left too many springbacks. In that kind of scrub it was better to make a break around the area required and burn it off. It should then be left for 12 months and ploughed with a share plough. The body of the plough should be taken off next the rear side wheel in order to give a good clearance for rubbish, or, better still, a plough should be obtained with the axle 9in. to 12in. longer than usual, because it usually became choked between the last body and the wheel. The object of allowing the sticks to remain standing was that, as the plough went through them they would fall the way the plough was going and slip through, but, if they were down, they would be lying in all directions, and would become tangled and choke the plough. In his experience in that way the number of chokes had only been one in each round of a 30-acre area. After dealing with the land in that fashion the rubbish and stumps should be raked into rows with a scrub rake. The rubbish could then be burned, and the stumps gathered up. If it were at all possible a stone house should be built for the homestead, as it was more comfortable to live in, foodstuffs kept better in it, and the upkeep was less. A vegetable garden should be provided for domestic purposes, and it also produced feed for pigs and poultry. Thousand headed kale should be grown, because it did not require much water in summer or much attention. He had some plants growing which withstood the drought, and as soon as rain came sprouted again. They would grow for three years, and if manured between the rows in winter, and watered in summer would provide good green feed. The best results could not be obtained from mallee land until the roots were ploughed out or killed by fire, because the ground was a network of roots, and the various kinds of weeds tended to check the growth of the wheat. A few years would be occupied in clearing the land, but then if properly manured it would yield good returns. Fallowing was the one thing needed. Sufficient land should be cleared that it might be cropped one year, then bare fallowed, and then fallowed deeply with a good share plough, making one crop in each three years. By that arrangement there would be abundance of land for grazing, which would not only save horse feed, but permit of a few sheep and cattle being kept, thereby converting the weeds into good manure for the land. Mr. H. Sanders said that, in dealing with low mallee it was best to log it both ways, as that left very few springbacks. Mr. J. R. Ling said that when the low mallee had been burned it was best to plough it without rolling or logging.

#### MINDARIE.

July 3rd.—Present: 11 members.

FARM MANAGEMENT.—The placing of the homestead was an initial consideration in farm management, said Mr. M. A. Francis, in a dissertation on that subject, and the area should be about 10 acres with all paddocks opening into it, and the buildings should be so placed as to facilitate the handling of machinery and produce. At the outset a complete plan of the finished farm buildings should be designed, and though only a portion might be erected at first, later on, when additions were required, they could be made in pursuance of the original plan, without any necessity to pull down or alter what had been already built. A simple method of bookkeeping should be adopted, containing a record of all transactions on the farm, including the crop returns of each season with a table of the quantity of seed and manure sown, variety of wheat, date of sowing, preparation of land, and any other useful information. Each paddock should be named or numbered, and the data compiled would be not only interesting but instructive. He advocated keeping only the best kinds of horses, cattle, pigs, or fowls, as they ate no more than mongrels, and would always sell well. The breeds he favored were:—Clydesdale horses, Jersey cattle, Berkshire or Yorkshire pigs, and Orpington fowls. Farm work should always be carried out in the best way. It was a mistake to attempt too much, because a smaller area well cultivated would return more than a larger acreage treated in a slipshod fashion. All farm stock should be well looked after

and well fed. The machinery should be the best procurable, and after use should be overhauled and repaired before being put away. Too much machinery should not be purchased at once, but time and money should not be lost by working out-of-date implements. A good orchard and vegetable garden should be maintained, and when the land in that district had been cleared a little more sheep should be kept on every farm. They were invaluable on land where wheat was grown and and there were weeds to destroy. The wool always sold well, and then there were the lambs, mutton, and skins as revenue producers. In conclusion he recommended keeping the best of every thing, and keeping a record of everything. Finally it should be remembered that the farm and the life on it were always what the farmer made them. At the previous meeting, on June 5th, Mr. E. L. Parker read a paper on the "Care of Farm Implements," particularly emphasising the necessity for a more extensive use of the spanner to keep all bolts and nuts properly screwed up whilst the machinery was being worked. Proper housing, repairing, cleaning, oiling, and painting of the machinery and implements were also insisted upon.

#### NETHERTON.

July 29th.—Present: seven members.

**INCREASED PRODUCTIVITY.**—It should be possible, said Mr. F. Byerlee, in a paper dealing with the question whether the South Australian farmer was doing as well as he might, to increase the stock carrying capacity of farms and make more fat stock available for the market. In that district it was necessary to grow oats as a change crop, and instead of selling the oats at the low market rate prevailing to feed them to sheep or cattle. Care in that respect would mean fat stock for sale, when the markets were high, better lambs, and better wool. In that district until the mallee had been killed cattle would be more profitable than sheep, which would be both necessary and profitable when the land had been cleared. Pigs could then be kept in greater numbers than at present. Barley, slightly discolored by rain, which was useless for market could be profitably fed to pigs. He had seen a mouse-proof wheat platform which he thought might be usefully employed for stacking hay. In the structure posts about 2ft. 6in. in height were set in the ground, about 4ft. apart. Each post was sawn off level, and half an empty kerosene tin was placed as a cap on the top of the post, and the platform was built over it. Mice could not get past the cap. It was necessary, of course, to prevent rubbish collecting under the platform. Every farmer should endeavor to increase the productivity of the State, with due regard to the conditions of each district, and then it would be unnecessary to seek outside assistance when the droughts came.

#### PARRAKIE (Average annual rainfall, 16in. to 17in.).

July 15th.—Present: 11 members and two visitors.

**CARE OF HARNESS.**—After observing that leather was growing dearer and more scarce, Mr. R. E. Jose, in a paper on "Care of Harness," said that more pains must be taken to preserve harness. New harness should be greased with neatsfoot oil before using, otherwise it cracked and could not be restored. The best way to oil harness was to clean it; the harness and neatsfoot oil should be warmed in the sun, and then the oil should be applied generously with a rag or brush, so that the oil penetrated well into the leather. Needles, thread, and black wax should be always on hand to effect repairs whenever required. Repairs by rivets, though effected more quickly, resulted in the rivets burning the leather if the harness were left standing in the hot sun for any length of time. Mr. W. F. Temby preferred castor oil. Mr. A. J. Beelitz recommended oiling twice a year with the best quality neatsfoot. Members generally agreed that sewing harness was preferable to the use of rivets.

#### PINNAROO (Average annual rainfall, 16.74in.).

June 16th.—Present: 24 members.

**DISCUSSION.**—A number of questions were discussed by the meeting. Mr. L. M. Ferguson recommended allowing horses to run loose at night in preference to tying them up. The condition of the average farm stable was not conducive to comfort or good health, and horses when loose had a better chance to keep warm by moving about. In summer time they could get water whenever they required it. Many horses would not lie down when tied. Mr. F. H. Edwards recommended the separation of bully horses from the others. Mr. Venning said that leaving the winkers on bullocks was an effective method of combating the trouble. Mr. R.

McCabe, in giving his reasons for preferring feeding crushed oats rather than whole oats to horses said that the crushed oats were more easily digested, and there was no risk of the paddocks becoming infested with self-sown oats through the horses' droppings. Mr. M. McCabe said that he would feed whole oats to horses when not over hungry, because they would masticate them better. When hungry horses were liable to bolt their food. Mr. H. Ledger, discussing the value of cocky chaff, said that it would not pay to feed it to sheep as a sole diet. Cocky chaff should be saved as a good standby, but oats or other grain should always be mixed with it. The effect of smutty wheat on pigs was referred to by Mr. B. L. Harfield, who said that two pigs of his which had been fed on smutty wheat developed a skin eruption. Smut was a liver stimulant, and in small quantities served as a tonic, but in large quantities set up disorders. A consideration of the class of sheep most suitable to the district induced Mr. W. Venning to prefer the Merino, which, when mated with a Shropshire or Lincoln ram, produced an excellent lamb for the mutton industry. Mr. E. H. Parsons preferred Merinos. Crossbreds were troublesome, unless the fences were very secure. Mr. F. H. Edwards said that the fly pest was less troublesome in such open-wooled sheep as the Leicester or Lincoln. There was some debate as to the three best varieties of wheat for the district, early, mid-season, and late, and the opinion was almost unanimously in favor of Vandilla King, Buld's Early (or Walker's Wonder), and Gluyas. Federation was mentioned as a good mid-season wheat. Mr. R. Edwards preferred the oil engine to the petrol engine on the farm as being less likely to cause fire, but the petrol engine was best for harvesting operations. Mr. F. G. Bonnin preferred long chaff for soundly-mouthed horses, and said that Mr. Place recommended chaff 2in. in length. Mr. Venning favored long chaff, except when feeding time was limited. Mr. Ledger and Mr. R. Edwards thought that 2in. was too long for chaff for general use. Mr. F. H. Edwards said that the difficulty in thinning a self-sown crop of oats with a scarifier in that district was the prevalence of stumps. He suggested cutting off the wings of the cultivator shares and then to closely follow that machine with the harrows. Mr. E. H. Parsons, in answer to a question, said that in feeding wheat which had been pickled with a solution of 1 per cent. to 2 per cent. of bluestone to stock or poultry it should be remembered that bluestone was an irritant poison, which, if given in light doses occasionally would perhaps cause little apparent injury, yet if frequently administered might have serious results.

#### ROSY PINE.

July 13th.—Present: 13 members.

MIXED FARMING.—Detailing the advantages of mixed farming, Mr. A. Sands, in a paper discussing that subject, said that, to get the best out of a farm it was necessary to have sheep, even if a commencement were made with only a few for the household meat supply, because they were not only valuable in that way, but they returned to the soil a considerable amount of manurial matter. They should be kept in small paddocks and frequently changed about. Each paddock should be sown with a different fodder plant, say one with rape, which would be ready in April and May; another with rye, which would provide pasture in June and July; and a third with cocksfoot, which was a good summer fodder. Pigs, cows, and poultry and fruit and vegetable gardens were essential on a farm, and it would be found that one thing helped to keep the other going. Green waste and surplus vegetables, fruit from the garden, and milk from the cows assisted wonderfully in the maintenance of the piggery and the poultry yard. The best pig for the farm was the Berkshire, the best cattle the Durham, and the best fowls Silver and Partridge Wyandottes and Leghorns. The cropping he advised was wheat, oats, barley, peas, maize, and sorghum; for hay, Tuscan and Blaney wheat and Algerian oats; and for grain, Marshall's No. 3, Vandilla King, and Federation. Maize and sorghum would return a fair profit on the fallow, and also improve the land. It was best to sow peas in July, and, when ripe, they should be harvested on a dull morning. They should be fed to horses, pigs, and cattle as hay. Mr. F. G. Bonnin considered that maize and sorghum did not improve the land. Mr. R. T. Hay's experience with sorghum was disappointing. Mr. C. Les (chairman) was adverse to sowing fodder on land that was to be cropped the following year. Those who could not afford to make their paddocks sheep-proof could keep pigs profitably. There was always a quantity of wheat, which could not be marketed at top prices, which could be fed to the pigs. Mr. R. E. Schiller said that in addition to keeping sheep a few foals should be bred each year.

## STIRLING'S WELL.

July 15th.—Present: sixteen members.

CARE OF IMPLEMENTS, VEHICLES, AND HARNESS.—Mr. H. J. De Laine read a paper dealing with the care of implements, vehicles, and harness. Before being put away, vehicles and implements should be overhauled and given two coats of paint, the first of oil color and the second containing a little varnish or boiled oil. In treating the wheels of vehicles, instead of merely cutting and shutting the tyres, the boxes should be removed from the naves, in order that the ends of the spokes might come down as far as possible. Each spoke should be wedged at the rim, to secure the proper size, in order that they might have an equal bearing. That operation involved increased outlay, but it made a better wheel. Work of that character should always be done in the hottest weather, when the wood was well shrunk. Mr. Wyatt said that harness should be washed with hot water and soft soap, and then given a coating of vacuum oil and fat black. Before machinery was put away, kerosine should be run through the bearings, which should then be oiled. Mr. W. McGlasson recommended blacklead and kerosine for the bearings of machines before being put away.—At a previous meeting, held on June 20th, Mr. Bowers read a paper on "Haymaking," in the course of which he recommended that hay should not be cut too early, but a start should be made when the grain was in the "dough" stage. It should be cut quickly. Weight was lost by cutting hay too green, and it provided better fodder when the grain was well formed. New hay should be allowed to lie in the field a day or so before being stooked. The stooks should be long and narrow, in order that the wind might pass right through them, and should remain in the field a fortnight before being stacked. If stacked too green hay became heated, and when opened was dark in color, a condition which produced inferior chaff. For hay production, half the area cultivated should be sown with wheat and half with oats. In stacking, the wheat and oats should be arranged in alternate loads, which produced a good mixture when the hay was cut for chaff. In building a stack, the centre should be higher than the sides, and the sheaves on the outside should be placed partly on edge, which enabled the outside of the stack to settle down better than if placed on the flat. The roof of the stack should be built with the butts of the sheaves outward, the first two layers projecting about a foot, and there should be a gradual slope thence upwards, the top being only the width of one sheaf lengthways, which would prevent the rain getting into the stack. It was well to sow early wheats for feed in the mallee country, where it was difficult to cut much hay, because of the dirty nature of the land. Early wheat, with a good rain to start it, grew rapidly. Horses should not be turned into the crop until it was well up from the ground, because of their proneness to pick up sand.

## WAIKERIE (Average annual rainfall, 8.89in.).

June 16th. Present: 33 members and six visitors.

UNDERDRAINAGE FOR IRRIGATION ORCHARDS AND VINEYARDS.—Without drainage irrigation was a failure, and if the soil were without natural drainage, artificial drainage must be resorted to, remarked Mr. W. E. Muspratt, in a paper on "Underdrainage for Irrigation Orchards and Vineyards." On sandy loams with a big fall it was almost hopeless to try and leach the salts out by flooding (after drainage) although it was the quickest and surest measure, contour grading being out of the question on planted land. So on that class of soil, which was by far the most subject to seepage, the great point was to start drainage before the trouble became at all acute. Not only were the drains and wells much easier to put down, but they would naturally stop a lot of injurious salts ever reaching the surface soil, where they did most damage. The usual methods of disposing of drainage water were wells or dams. He had little faith in the latter, few localities being suitable, and as one had only evaporation to rely on, it would take a very large dam to be effective. A good well was best, and providing one started before the land was waterlogged, that should not be such a very serious problem. Most wells in that district were made 4ft. 3in. x 2ft., with stays down the centre forming a ladder. Care should be taken to timber the well from the start, because water might not only be struck on the way down, but it was almost a certainty that when the drift sand was reached the water would rise perhaps some feet. It was as well to put down a catch pit, say, 6ft. from the well proper and the same

size, about 2ft. deeper than the point where the main drain came in. The reason for that was to catch the silt, thus avoiding danger of it getting into, filling up, and spoiling the well. That catch pit required watching and cleaning after the pipes had been first laid and irrigated over, as the soil not being set, naturally the silt was most in evidence. The well should, if practicable, be put down in the lowest spot to be drained; the main drain should be put down on the smallest fall of the land, and the subsidiary drains on a greater slope. The reason for that was that it might be necessary to make a fall for the pipe for the main drain, which added to the cost, and subsidiary drains in all cases would total a much greater length. The subsidiary drains could run into the main at an angle (herringbone) or square. A point was made in favor of the former in most books, but he put his own down on the square. Old-established trees and vines, especially the latter, did not lend themselves to cutting drains through on an angle. Those tee or angle pipes could be obtained with the ordinary ones, but being extra, had to be specified. The distance between subsidiary drains should be about a chain in sandy soil at, say, 5ft. deep, and if in soil of a stiff nature closer and not so deep. He liked to lay his own pipes on the clay, if possible, as there a good hard bottom could be obtained on which to lay the pipes, and also they caught the water as it passed over the clay stratum, which as a rule, but not always, followed the fall of the land. A guide for the depth of drains in badly affected blocks was where the water table was found. They should keep a foot below it. It might be found necessary, after a couple of years, to deepen the drains. To go the full depth for a start one had to try and lay pipes in sludge about as thick as porridge—practically an impossible task to do properly. Most books laid down 4ft. as being deep enough, but personally he liked 6ft., providing the soil was of sufficient depth; but they should not go too far into the clay. The first work was to take levels. In the absence of a dumpy level the following method was useful:—“Measure the line of drains to be put down, then fix a tee piece of wood at the lowest end. On top of this place an ordinary builder's level, arranged with two peep sights, one at either end. See that the level reads at correct level, then place a staff at the upper end of the line with a man in charge. Now take a line through the two peep sights on to the staff, and get the man at that end to mark the exact spot of the sight line. Measure from this spot to the ground, then measure from the line of the two peep sights to the ground; take the upper measurement from the lower, and the difference will be the fall in inches of the ground between level and staff. This can be checked by taking the sights from the higher ground, and placing the staff on a level spot and tying a piece of wire on. Now reduce this in proportion to the same fall in 2ft. 6in. For example, suppose the length from level to staff be 200ft., and the fall 10in.; reduce this in proportion to a 2ft. 6in. line and the fall would be 4in. (This is as small a fall as it is safe to work to. The greater the fall the easier it is to lay the pipes. Having found the fall of the land, place setsquares just clear of the trench and at each end, at, say, 5ft. above the intended pipe bed. Intermediate setsquares can now be driven in every chain, using the line of two sets already in as a guide for the rest. This gives a line parallel to the pipe bed, and is a guide to men digging, as by using a measured stick and looking along the sets they may know how deep to go. When trenches are to be over 5ft. deep, place set squares as before, only 6ft. or more, as desired, above pipe bed, and as the men get the trench down measure down the side of the trench from the top of sets (an equal distance in each case) and drive in pegs, leaving a couple of inches or so showing at a handy height for sighting along. Now take two pieces of timber, 2in. x 1½in. and 2ft. 6in. long, see the same are straight and true; tack a piece of leather on the ends, forming a hinge; expand the other ends ½in. and make fast by tacking a piece of wood on the side. This makes a set for placing on top of three pipes in the trench. The level placed on top of this should read level. I advise painting the hinge end of the set, say, red, and this should always lie uphill.” It was very important that that work should be done properly, as if the pipes were not laid evenly in the trench, and the fall was not gradual, without any undulations, all the work might be thrown away by the silting up of the pipes. They should always start to lay the main drain pipes from the well upwards. If the fall of the land was not enough, they should allow, by starting deep enough at the well, so as not to run too shallow at the top end and still keep a good fall. He advised that the main drain should have a fall of at least 20in. in 200ft., or 4in. in 2ft. 6in. When laying the main they should

shoe.

put in angle or T pieces at points where the subsidiary drains were wanted to branch off, and half a brick placed on the opening would keep it clean. They should never open up all the trenches first and lay the pipes in when finished. If that were done, considerable trouble would be met with from the falling-in of the sides of the trenches, thus destroying the firm bottom which was essential for the properly laid pipes. In digging the trench the surface and subsoils should be kept on different sides of the trench, so that they might be put back in their proper places. If the trench was not to be more than 4ft. 6in. deep, a top width of 18in. would be enough; if deeper than that the width should be at least 20in. The trenches could be narrowed as they went down, but enough room should be left for the digger to swing his shoulders. He used a small-sized irrigating shovel for making the pipe bed, but a proper drainage tool could be bought for that purpose. Enough bed should be prepared for three pipes, and they should lay the same, fitting the joints as close as possible, and placing over the joints a piece of two-ply building paper. A cut should be made along the width of paper, and it should be rolled into 2in. strips, and divided into five. That would give a piece about 7in. x 2in. That covered the top half of the joints, and prevented soil from silting in before it had time to set. On the top of the paper, which had to be held in place by the pipelayer, a man on top of the trench should be employed to carefully lower shovelful of earth as the pipelayer directed, the latter packing the same in round the pipes to prevent them shifting; 3in. or 4in. of earth was enough to secure the pipes. The earth taken out from the next spit for the following three pipes should be placed on top of the soil on the last-laid pipes. That saved work. The pipelayer could manage that himself by scraping down soil from the sides of the trench, using the hoe with five or six inches of handle only. That was the cheaper method of the two. That method should be continued throughout, and the water which accumulated in the trench allowed to run through the newly-laid pipes, carrying it off to the well. They should not fill in the trenches as they went, but it was well to put in a foot at a time. The first should be put in each day, covering the length of pipes laid that day. The balance could be put in any time in layers, a foot at a time. He did not quite fill his trenches, and before irrigating ran a fair stream down each trench to settle the soil, after which it could be levelled off. If that was not done and they had to irrigate across the trenches, the furrows would be continually breaking, besides making the next cultivation rather dangerous to the horses. When finishing off each drain, if in a convenient place, it was well to put in a T piece facing upwards. They should place a brick on the dead end and fetch the pipe up to the surface. That served three purposes: it helped to aerate the drains, allowed one to flush out when necessary, and should a clog occur, helped one to locate the particular drain where the trouble existed. Before filling the trench they should cut off all roots protruding, as if left the earth thrown in gave them a slant downwards, and it would not be long before they found their way into the pipes and gave trouble. It was also well to make a plan of the drains for future reference. He did not advise the use of perforated pipes. He preferred 3in. pipes for both main and subsidiary drains. Those cost £5 per 1,000 at Mikhura, or £10 per 1,000 on the land (freight and carting cost about £5), enough to do 15 chains of drain. T and angle pieces cost 1s. each. The well timber should be 4ft. 6in. x 6in. x 1in., and 2ft. x 6in. x 1in.; corner battens 3in. x 1in.; galvanized iron nails should be used; side pieces and stays in centre should be 3in. x 2in.; stays should be let in side pieces and be put in 16in. apart to form a ladder. The windlass should have a base rather larger than the well, to rest outside the timber. An oil drum made a good bucket, and a prospector's pick and short square mouthed shovel would also be needed. Care should be taken in putting down the well, both to go down square and to keep to the exact size, so that the timber fitted in tightly. The latter was important, as if timber slipped it might allow the whole well to tilt up. If the land were waterlogged, a "flow down" pump should be on hand. It was easier to pump the water out than to have to send the bucket up three or four times full of water against one of soil. The water was usually salt, and therefore it required to be run off where it would do the least damage. A hand bore for testing sinking could be made from 1in. piping cut into two 3ft. 6in. lengths, one each 9ft., 12ft., and 15ft. A handle could be made of two 1ft. lengths screwed into a T joint. On that there should be a 2ft. length of piping. That was handy

in making a start. It was well to use 3in. and 1½in. auger bits, the eye in shank cut off, and a reducing socket screwed on, in order to fit the piping. The 3in. auger would be found the best for the first 15ft. or 20ft., after which it became difficult to pull up. Then the 1½in. auger should be put on. It was not only easier to pull up, but having sharper turns did not allow the earth to slip out, which the 3in. one did, especially if water were struck on the way down. That was hard work, and required two fairly strong men. It was not well to tackle that work in windy weather. Six inches would be found any amount to bore at a time, and then it should be lifted and cleaned. He had seen good work done with a patent posthole sinker screwed on to piping to bore down to the drift sand in the well after too much water had been struck to deal with, one hole being put down each side of the ladder. A "low down" pump would not lift any great amount of water after 20ft., and therefore a platform had to be put in the well, using only one-half, the other having to be left free for the bucket. A rung might have to come out of the ladder for working the pump handle. At the close of his address, Mr. Muspratt answered a number of questions.

#### WAIKERIE (Average annual rainfall, 8.89in.).

July 21st.—Present: 21 members.

PEAR AND APPLE PRUNING.—In the course of an address on pear and apple pruning, Mr. W. Francis recommended pruning to three leaders at the first year's pruning, and doubling the number of leaders every year until four years old, cutting all laterals back to spurs 3in. long, and in summer time cutting back leaders to one-third of the growth made in winter. In summer each year afterwards the laterals should be pruned to spurs. For those who were anxious to get fruit crops early he advised tying the leaders to a hoop or stake in the centre of the tree, after the third year, leaving the trees unpruned, but that should only be done with trees growing strongly. He considered that the end of January was the best time for summer pruning, but on no account should trees be irrigated afterwards because it started the spurs growing again. Cutting to an inside bud was the best means of opening out trees. The top bud should be allowed to grow about 6in., and then the growing point should be nipped out. That would have the effect of starting the buds lower down growing outward in the desired direction. The top shoot should be cut out at the following winter's pruning. Before cutting off the lateral growths, a live bud should be looked for at the intersection of the leaf and shoot, as the Jonathan usually had several blind buds on the first growth of the lateral. Growers should save their small apples when storing for use later in the season, because the large apples, over 2 1-3in. in diameter, were too watery, and would not keep, especially the Jonathan and Cleopatra varieties.

#### WILKAWATT (Average annual rainfall, 16in. to 17in.).

July 15th.—Present: 14 members and one visitor.

COLT BREAKING.—It is as well to commence handling foals when quite young, advised Mr. J. Ivett, in a paper treating of the handling and breaking in of horses. From the first the animal should be shown that it had been mastered, and there would be no trouble with it afterwards. It should be taught to remain tied up or he led, and by the time it was two or three years old, it would be perfectly quiet and tractable. All that was necessary to break it into harness was to put the moulting tackle on for a couple of hours for two or three days. Care should be taken, however, not to make the rein fast in the middle. It should run through a ring, so that the colt could move its head either way without taking the strain off either side of his mouth, otherwise there was the chance of the colt being mouthed on one side and not on the other. Then the colt should be harnessed up and placed in the body of a wagon team with a rope around its neck, made fast to the leader's chains, not too tightly, but just sufficiently to keep him in his place. If he would not go into the collar at first he should not be forced with a whip, but be allowed to have his own way, and he would gradually work up to it. Should there be no improvement at the end of two or three days, the neck rope should be tightened, so that there would be a strain on it, and if the colt attempted to hang back he should receive a sharp cut with the whip, but if he should jump into the collar, the whip should not be used. Good leaders were required for breaking in



young horses. When driving a team of horses it was always best to whistle or use the same word, so that they would all start together, a much better system than calling to each by name.

**FALLOWING.**—A paper on fallowing was read by Mr. E. Altus, in the course of which he recommended that fallowing should be done in July, or not later than the middle of August, the ploughing in the majority of cases being 3 $\frac{1}{2}$  in. deep, though in some places it might be deeper and in others shallower. After ploughing the harrows should be used before rain fell, the stumps picked, and the shoots, if there were any, cut. Then the ground should be harrowed again and sheep turned in until the middle of September, when it should be worked lightly with a skim plough, and harrowed again. The ground was then ready for the drill, provided the seed was to be put in dry, but should it be left until the rain came, it should be cultivated lightly once more. Sheep should be kept on the fallow as long as they could possibly find feed on it, because they not only kept down the weeds, but packed the soil.

#### WOODLEIGH.

June 12th.—Present: nine members and two visitors.

**ADVANTAGES AND METHODS OF FALLOWING.**—In that district Mr. P. R. Hodge, in a paper on the advantages and methods of fallowing, said the best method of farming in any district could only be determined by experiment. The essentials were that the land should be fallowed in order that the rain which fell might be stored in the soil, and that the fallows be worked to aerate the soil, destroy weeds, prevent loss and waste of moisture by evaporation, and prepare a seed bed. Though it was estimated that early fallow retained in the soil moisture equivalent to two or three inches of rainfall, all the benefits of fallowing were not due to that conservation, because it would be found that the results obtained from fallowed land were greater than from unfallowed, where moisture was plentiful. Ploughing sweetened the soil, and working fallow conserved the moisture. A smaller area well fallowed was better than a great acreage scarified. Working fallow kept the surface soil loose and dry, an earth covering affording protection to the moisture-laden earth beneath. Experiments had shown that about 5 in. of rain, during the growing period should admit of 15 bush. of grain, or 1 $\frac{1}{2}$  tons of hay per acre being produced, provided that the ground was in good condition, so far as soil moisture was concerned, when the seed was sown. Land that had been cropped the previous year should be ploughed in the early spring to a depth of 3 in. or 4 in. All loose stumps should be picked, and the large ones stacked. The harrows should then be used to make a fine surface. About September a tine cultivator or a scarifier should be put over the land, and, if available, a flock of sheep should be turned in. At seed time the ground should be worked before drilling with a disc harrow. The only way to keep weeds down was by frequently and thoroughly working the land.

**BOWHILL, July 15th.**—Arising out of a question by Mr. J. D. Cockshall whether it was preferable to use a plough or cultivator in fallowing drift sand, some discussion took place, in which members generally favored the use of the plough.

**CLANFIELD, June 17th.**—Several papers were read, and there was some discussion on the question how the Government could best assist farmers in the mallee country.

**COONALPYN, June 16th.**—An inspection was made by Mr. Colebatch (the Principal of the Roseworthy College) of several farms. Subsequently Mr. Colebatch addressed the tenth annual meeting of the Branch on the subject of fallowing.

**MANTUNG, July 13th.**—Discussion took place on the question whether shallow or deep ploughing was advisable. Mr. Lehman said that he would plough 3 in. deep for seeding. Mr. G. N. Baker considered 3 $\frac{1}{2}$  in. was best for fallowing, and 2 $\frac{1}{2}$  in. for seeding. Light rains benefited a crop more on shallow ploughing than on deep. Fallow should only be cultivated deeply enough to cut the weeds. Mr. W. Stewart advised shallow ploughing while the soil was loose, but when a hard bed formed, it should be broken up. Mr. P. J. Baker recommended ploughing to a depth of 3 in. in light soils.

MONARTO SOUTH, June 17th.—A paper on "Shearing" was read by Mr. P. B. Frahn, in which he recommended that sheep should be "crutched" when grass was plentiful, and dirty sheep should be "dagged" before being put on the shearing board. The board should be swept after each sheep had been shorn to prevent trimmings being mixed with good wool. Second cuts should be avoided. By shearing up the neck and down the belly the wool should not be cut. The fleece should be thrown on a table with gratings sufficiently wide to allow all locks to drop through. Damp and stained pieces should be carefully dried before baling.

MORGAN, June 24th.—Mr. G. Hoffman read a paper in which he dealt with the subject of burning scrub, and he remarked that for the burning to be effective the scrub should be thoroughly dry, and to attain that end it should have been felled at least six months previously. The end of February or the early part of March was the best time for the work. It was essential that the burning should be done quickly, before the scrub was affected by moisture, which retarded the burning and reduced the heat, which was necessary to kill the stump. A day should be chosen for burning when a convenient wind was blowing, a light breeze being most suitable.

PARILLA WELL, May 26th.—Mr. J. S. Ferguson read a paper entitled "The Agricultural Bureau and its Work," in which he dealt with the advantages which the farmers had reaped from the activities of the Bureau, more especially the *Journal of Agriculture*.

POMPOOTA, July 20th.—A paper on "Poultry" was read by Mr. B. H. Fidler.

## SOUTH AND HILLS DISTRICT

HARTLEY (Average annual rainfall, 15in. to 16in.).  
August 18th.

HOMESTEAD MEETING.—Members of the Branch, together with a number of visitors, including Messrs. G. R. Laffer, M.P. (member Advisory Board of Agriculture), C. Matthews, P. H. Suter (Dairy Expert), H. J. Apps (Dairy Instructor), H. J. Finnis (Acting Secretary Advisory Board), and representatives of neighboring Branches, foregathered at the homestead of Mr. J. M. Hudd, at Bletchley. During the afternoon a general inspection of the property was made, particular interest being taken in the bore lately put down, and the fine dairy herd. In the evening the visitors were entertained by Mr. and Mrs. Hudd at a banquet, at which Mr. B. Wundersitz presided. At the instance of the Chairman, the loyal toast was honored, after which Mr. Laffer, M.P. submitted "The Empire"; Mr. Beavis, "Our Soldiers," responded to by Lance-Corporal J. T. Hudd; and Mr. C. Matthews, "The Parliament," which was acknowledged by Mr. Laffer. "The Local Branch of the Bureau" was proposed by Mr. Finnis, and responded to by Mr. J. Stanton (Hon. Secretary). The toast of "Kindred Branches" was in the hands of Mr. Hudd, and was acknowledged by Mr. J. R. Rankine (Hon. Secretary Strathalbyn Branch); Mr. C. L. Taylor submitted the toast of the health of Mrs. W. Brook, acknowledged by Mr. C. Brook; Mr. Westwood "The Visitors," Mr. Taylor responding. "The Ladies" was also submitted, to which Mrs. Cleazy replied, and at the instance of the Chairman, the host and hostess were thanked for their hospitality.

KANMANTOO (Average annual rainfall, 17.90in.).

July 15th.—Present: eight members.

FALLOWING.—Fallowing should be commenced as soon as seeding has been completed, declared Mr. R. G. Critchley in a paper on the subject, because the horses would be in better condition than if turned out for a few weeks and then taken in again. In that district 4in. or 5in. was quite deep enough to plough. After ploughing the land should be harrowed in an opposite direction to the ploughing and then cross harrowed to kill all weeds. In the spare time between shearing and hay cutting the fallow should be treated with a spring-tooth cultivator, and

any time occupied in harrowing again would be well spent, because it would conserve moisture. In March the ground should be cultivated lightly, and should be drilled in April (provided sufficient rain had fallen) and then harrowed in the opposite direction to the drill. Fallow treated in that way would amply repay the farmer.

#### LONGWOOD (Average annual rainfall, 37in. to 38in.).

June 17th.—Present: 16 members and two visitors.

**THE PIG INDUSTRY.**—After referring to the fact that every portion of the pig could be marketed, Mr. W. J. Davies, in a paper on "The Pig Industry," advised every farmer to keep pigs. Statistics were quoted showing the progress of the industry in South Australia, and the import and export trade of Great Britain and America. Pig-raising gave little trouble, and the initial outlay was small. A sow usually produced two litters per annum, which should, by proper management, be farrowed in March and September, thus enabling the young pigs to acquire strength before the cold of winter or the heat of summer set in. A useful contrivance in the sty was a strong piece of wood erected around the four sides, about 8in. or 10in. from the ground and projecting about the same distance from the wall. That enabled the young pigs to avoid being overlaid by the sow. Usually, when about to lie down, the sow stood against the wall, got down on her knees, and then slid to the ground, her body being against the wall all the time. If there were any of her young under her and against the wall, she laid on them and they were unable to extricate themselves, but with the arrangement he suggested, they could escape under the rail. Shade and a mud bath should be provided in summer, because the former prevented sun scald, and the latter afforded the animals a means of cleaning themselves. He recommended the Middle York as a bacon producer, and the Berkshire as a good "porker," which matured early. With ordinary care the Middle York should be ready for killing in six or eight months, and should weigh from 160lbs. to 200lbs. They should be fed on raw vegetables and skim milk with a little barley meal or pollard. Pigs fed on skim milk and barley meal, with a few peas each day, made the best bacon. Apple feeding, unless finished off with meal or pollard, produced soft, second class bacon, and too much animal food made the flesh coarse. Pigs, if kept in a clean way, would be clean themselves. If from the beginning young pigs were given dry, warm beds, they would not foul them. The sties should be cleaned out every day, otherwise muck was carried into the bedding on the pigs' feet, and the bedding then becoming cold and wet, the pigs fouled it. In answer to a question Mr. Davies recommended the use of raw food because cooked food tended to impair the digestive organs and was more expensive to handle. Pork cost 5d. per lb. to produce, and the selling price was 9d. In a general discussion, the methods of the wholesale produce merchants were condemned.

#### LONGWOOD (Average annual rainfall, 37in. to 38in.).

July 15th.—Present: 12 members and two visitors.

**RUTHERGLEN BUG.**—Treating of the ravages of the Rutherglen bug and some measures of combating it, Mr. J. C. Blakely said that the pest attacked garden crops and orchards. The female laid large numbers of eggs, which were preserved during the winter in rubbish or scrub which afforded shelter, and were hatched out in the spring. In a few days wings developed, and the insects moved about the gardens in swarms. In that district the bug had only one hatching in the year. To eradicate the pest he used a piece of chaffbag, the full length of the bag, and about 14in. in width, and painted it with coal tar. He attached a long string to each corner of one end of the bagging and placed it between two rows of potatoes. The bag should then be dragged along with an attendant walking behind with a stick in either hand to knock the stalks of the plants. As soon as the plant was struck the pest would fall on to the tar trap. When the trap was full it should be burned. It might be necessary to repeat the operation twice or even three times. The trap was effective, because of the habit of the bug, whenever disturbed to fall off the bush and remain on the ground for a few minutes. Sprays had been tried unsuccessfully, because the pest only moved from one part

of the garden to another, returning to the sprayed portion later on. The bug was most troublesome in the warmer part of the season, but it soon disappeared when the days became shorter and the nights grew cold. Mr. Nicholls had dealt effectively with the pest by using long, shallow trays partly filled with kerosine and water. The tray was drawn between the rows, followed by an attendant knocking the bushes. As soon as the bug came in contact with the kerosine it was destroyed.

#### MOUNT BARKER (Average annual rainfall, 30.93in.).

June 21st.—Present: 41 members.

LUCERNE GROWING.—Lucerne unquestionably took first place among forage crops, observed Mr. B. Stephenson, in an excellent paper on "Lucerne Growing," and it thrived best in a warm climate with abundant rainfall, conditions which would induce a growth providing many heavy cuts in one season. The heaviest yields were obtained on alluvial flats, where the roots could penetrate deeply in searching for moisture, but it could be grown on almost all classes of soil, from sandy loams with clay subsoil to stiff red loams. In fact it would do well in any locality where the summers were hot and the roots could get down to moisture. Shallow soils, resting on slate or other stone foundations were not adapted to lucerne growing. In every holding in that district some small plot could be found in which lucerne could be profitably grown. One essential to complete success was abundant moisture, and, when that was available, the crop made continuous growth in warm weather, and cuts might be obtained in rapid succession. Good drainage was absolutely necessary, because the crop deteriorated when swamped. Lucerne would not thrive on sour soil, and lime was a very beneficial, if not an absolutely essential ingredient. Except where very shallow the soil should be deeply ploughed, but not sufficiently deep to bring the clay subsoil to the surface. If necessary to produce a fine tilth, the land might be cross ploughed and harrowed two or three times, until the surface had been reduced to a fine tilth. A level surface was advisable if the land were to be irrigated, but otherwise it was not essential, so long as all stones, &c., were removed. In manuring, if using the product of the farmyard, a good dressing of well-rotted stable manure—20 or 30 loads per acre—ploughed in to a depth of 5in. or 6in., and worked down finely, would put the ground in excellent condition for seed. If artificial manure were selected—he preferred bonedust—from 5cwt. to 5cwt. per acre would be ample. A paddock in that district, upon which 5cwt. of bonedust had been used when seeding, had been growing lucerne, without irrigation, for 20 years, and was still producing abundant crops. If sown with the drill, the seed should be only scratched in, and if broadcasted, light harrowing was sufficient. If the ground were very loose it would be sufficient to run over it with a light slide, which he preferred to a roller. The quantity of seed to sow varied with the class of soil. Rich flats with moist subsoil would carry a very thick stand, and from 15lbs. to 20lbs. of seed per acre might be used, but in dry country, from 6lbs. to 12lbs. would suffice. Sown with other grasses, for pasture, 4lbs. or 5lbs. sometimes gave good results. It was important to procure good seed. Hunter River seed was considered to be the best, but local seed, having the advantage of being acclimatized, was preferable. The best time for sowing was the middle of October, when the weather was warm enough to drive away the lucerne flea. He deprecated autumn sowing, because, with the first rains, the flea would return and destroy the young plants. When the crop was from 9in. to 12in. high it should be cut with a sharp scythe, and allowed to lie as cut and wither. That would encourage the young plants to stool. The crop should be cut when the flower appeared on half the plant, or perhaps a little more, because it then possessed its best feeding value. Lucerne improved with working, and if harrowed, or in a small plot, raked over, after each cut the succeeding growth would be greatly assisted. The disc drill or cultivator was a splendid implement to work the ground because it did not tear plants but sliced them, and though it might appear to be destructive, good results were soon apparent. When patches of the crop appeared to be dry and withered it was well to cut it, work the ground, and give the crop a fresh start. If the ground were well manured in the beginning an annual top dressing of farmyard manure, super, or lime would be all that was required afterwards. Lucerne lasted much longer if not grazed, and in no case should

horses be turned into it, because they injured the crown of the plant. The first year after sowing the crop should be mown, because if grazed the continued nibbling and treading of the animals injured the young plant. When feeding off was resorted to, the more quickly it was done the better in order that an even plant bed might be provided for the next crop.

IRONBANK, July 15th.—A discussion took place as to the best varieties of peach, plum, and nectarine to cultivate, and it was agreed that in that district those which did best were:—Plums—Climax, October Purple, Grand Duke, Giant Prune, Sultan, and Federation; nectarines—Goldmine.

LONGWOOD, August 12th.—The inclement weather rendering a pruning demonstration impracticable, members discussed garden subjects, especially the root borer insect, which it was stated was a common cause of "die back."

MEADOWS SOUTH, July 12th.—In the course of a general discussion Mr. G. Ellis said that in growing peas he had, in one case, used 1cwt. bonedust and 1cwt. Thomas' phosphate per acre, and in other cases he had used only 1cwt. of bonedust. The crop returns were practically identical.

MOUNT COMPASS, June 17th.—Extracts from various journals on "Elephant Grass" and "Liming of Soils" were read and discussed. A statement of the rainfall for the year was tabled.\*

## SOUTH-EAST DISTRICT

KYBYBOLITE (Average annual rainfall, 22in.).

April 20th.—Present: six members.

METHODS OF CULTIVATION FOR WHEATGROWING.—After referring to the varying conditions of soil and climate of different localities, of different farms in the same locality, and even of different fields on the same farm which required different treatment, Mr. L. S. Davies, in a paper dealing with the methods of cultivation for wheatgrowing, said that the first operation in cultivation necessary for the growing of a wheat crop was that of ploughing, which should be performed to a depth suitable to the time at which the work was done, and the nature of the soil to be worked. The time for ploughing was important. In South Australia, where wheat was the principal agricultural crop, it followed that, as bare fallow was necessary in almost every rotation to obtain the best results, the wheat would be grown on bare fallow. The time for ploughing for fallow would be regulated by the need for retaining moisture and the area which the farmer had to cultivate. Where it was required to conserve moisture the earlier the fallowing the better in order to provide for the absorption of the winter rains, but where the rainfall was fairly assured late fallowing would yield the best results. The choice of time would be influenced by the time required to complete the operation, because the work should be finished before the ground became too hard to plough. In fallowing, where water conservation was the aim, it was necessary to harrow the soil immediately after ploughing, and to work it as often as was required to preserve a loose surface, which would act as a mulch during the hot summer months, when so much soil moisture was lost by evaporation. When water conservation was not necessary, the fallow might be left in a rough state, the only factor necessitating cultivation before the summer being the elimination of weeds. The reason for leaving the ground in a rough state under those conditions was that where there was plenty of soil moisture there was generally increased need for better aeration of the soil, in order to make available the greatest possible quantity of plant food before the crop was sown. In that district it would probably be found by experiment that cultivation would give no advantage before the late spring or early summer, when the land should be worked with a cultivator, before it became dry. The use of the cultivator was not essential in that operation, though it would probably be found necessary in the majority of cases. If the harrows would give the required result, he always

preferred them. In the treatment he had outlined he had proceeded on the hypothesis that the land was free from weeds, but, where sorrel and other weeds appeared it would be found necessary to give special cultivation to cope with them. The land should be worked whenever weeds were present, and, as they appeared after the rains, that was the time when the cultivation should be done. It might be urged that weeds would appear before any summer rains had fallen, but, in that case, they must have commenced growing before the surface moisture dried out in the early summer, when, if a cultivation had been made, the growth would have been checked. In all summer cultivation the best results were obtained when the ground was damp, but, for killing weeds, more particularly sorrel, the operation should be deferred until the weather had become bright and hot after the rain. It was quite possible in summer, when occasional rains occurred, as in an average season, to obtain as good results in weed killing by working the land when a suitable quantity of moisture was present in the surface layer as when working dry. He emphasised the possibility of securing as good results from working the land wet, under the conditions he had indicated, as when worked dry. In itself dry working must always be a disadvantage, because it produced an unsuitable physical condition of the soil, causing it to run together. It also exposed the soil bacteria—very valuable agents in making plant foods available—to the hot sun, causing them to be destroyed, and the effect which their activities might have produced was lost, besides increasing, as it was generally believed, the liability of the crop to be attacked by takeall, although there was no definite proof of it. To secure even depth in sowing, the land should be harrowed before the drill was used, and the drill should be worked across the harrowing. To properly cover the seed, the harrow should follow the drill. When the wheat plant had attained a height of 4in. or 5in. harrowing was beneficial. In the preparation of stubble and pasture land best results were obtained from early ploughing. The depth should be regulated by aiming at the production of a firm seed bed before the seed was sown, an essential for good germination in wheat. The soil in that district lent itself to the easy production of a firm seed bed, and it was possible to plough to a greater depth in working stubble or pasture land in the autumn than would give the best results in most other parts of the State. In most soils, if the ground were harrowed immediately after ploughing and reworked with the same implement it would be found that the condition of tilth required would be obtained. Unless the appearance of weeds or the setting of the surface necessitated the use of the cultivator, the harrows would give the best results. Mr. E. C. H. Schinkel preferred one good working with a skim plough to a number of inadequate workings. Mr. Hahn said that working with a plough was not sufficient to destroy a certain class of weeds, such as sorrel. He preferred the spring tooth cultivator to bring the weeds to the surface.

#### NARACOOORTE (Average annual rainfall, 22.60in.).

June 10th.—Present 21 members.

TRAINING AND CARE OF A COLT.—As a preamble to a paper on "The Training and Care of a Colt," Mr. J. J. Donoghue submitted a number of "Don'ts," enjoining patience, good temper, and kindness in the handling of a young animal. When the colt was yarded he would probably be wild, and run round, and it was well to allow him to do so, for he would tire eventually. Then it was necessary to catch his eye and keep him fixed until a halter had been placed on him. A large bar bit with two bit straps should then be put in the animal's mouth and buckled to the halter, just tightly enough to press on the cords inside the horse's mouth. A backband should then be put on and buckled tightly with a ring on either side, both rings to be the same height. Then with a pair of reins tied evenly back to the rings on the backband just tightly enough to permit him to reef a little, he could be left for three or four hours. After that one rein should be released and the other tightened, which would cause the animal to walk in a circle. After 20 minutes of that work a change should be made to the other side. By that time it should be possible to hold the colt. Leading was next. A colt must be led. Like moulting, it was better done without wasting strength. For that purpose it was necessary to take a rope or cord, about 8yds. in length, and cross it over the loins, allowing the loop to fall low on the bridle and bring each end along each shoulder to rein. The operator would then have a rein in his hand, and when ready to move off he should tighten the rope smartly. After repeating that operation once

or twice the colt would walk after the person leading him. The colt should then be tied up with a strong rope tightly around his neck, with the loin rope on in the same manner as for leading, only a little shorter than the neck rope, and he should be allowed to remain in that way for a whole day, but should be given plenty of feed. The legs should be well handled and the feet trimmed, if needed, before putting the colt to work. He should be put to work with only a halter on so that he might see everything. A colt should always be worked in single harness, and his mouth allowed to get well before he was taken to the team. He preferred a sledge with a big box fastened to it for the first, with a long rein. The colt should have a well-fitting collar from the commencement. To prevent sore shoulders it was wise to rub as much sulphur as possible into the hair on the shoulders before the collar was put on. That prevented the shoulders sweating, and they did not gail. In about a fortnight the colt, if his mouth were well, might be introduced to the team. If it were put into the team with a sore mouth there was sure to be trouble. Half a day's work was ample until the colt became hardened. He preferred breaking in a colt at 2½ years, just when he was losing his nippers, and was not able to get his food so well, and therefore, if broken in and fed well he would make a bigger horse than if left for another year. Mr. W. Loller said that it was a great mistake to rein a colt hard when first handling him; light reining made a softer mouth, whereas a tight rein produced a hard mouth, and it always remained so. Mr. A. B. Feuerheerd said that it was essential to know the temper and disposition of the horse one was dealing with. No two colts had the same disposition, and they should be handled according to their disposition. Mr. S. Hart said that it was a mistake to handle a colt too quickly. He should be gradually developed.

#### NARACOOOTE (Average annual rainfall, 22.60 in.).

July 8th.—Present: 34 members.

ANNUAL MEETING.—This Branch, which was established 27 years ago, held its annual meeting on July 8th, and to a record attendance, the Hon. Secretary (Mr. W. H. Smith) presented a comprehensive and illuminating report of the year's proceedings. From this the following extracts are printed:—"To be able to apply the word 'record' in connection with the doings of the Branch during the past 12 months, after having used it in so many instances, when presenting the 1914-15 report, is perhaps expecting a great deal. Yet, however, it is most pleasing to be able to record that with one exception (that of the number of papers read) the session just ended has proved to be the record one since the formation of the Branch 27 years ago. This is a most gratifying fact, and one of which the members might well feel proud. Perhaps the greatest factor tending towards the continued success of the Branch has been that fine spirit of concord which has always prevailed among the members at the meetings, and it has been of such a nature as to make it a pleasure to assemble together. Members have their differences of opinion as regards matters agricultural, and rightly so, too, and varied as the opinions are (as expressed at the meetings at times) nothing that tended to mar the harmony of the gatherings has ever arisen, as the jovial nature, so characteristic of the agriculturists, has always been in evidence, and all recognise the fact that they are assembled together to disseminate knowledge, which may perhaps be the means of not only helping their fellow producers, but also their districts and the State generally. During the past year 12 general meetings have been held, and the attendance of members has been splendidly sustained throughout, the highest number at any one meeting being 30, and the lowest 19, showing an average per meeting for the year of 24. Within three years the total membership, the attendance of members, and the number of papers read, have been trebled. This in itself is sufficient proof of the keen interest being taken by the members in a worthy institution. In perusing the list of those connected with the Branch for the full term it is noticed that whilst some members have established attendance records worthy of being proud of, others again have made their names conspicuous by their desultory attendance, and it is to be hoped that the members of the latter class will shake themselves up a little and realise their responsibilities and endeavor to make amends during the coming term, and to also study the meaning of the word 'reciprocity.' A feature of the past session has been that the splendid array of produce, &c., displayed at a number of the meetings, some of the exhibits reflecting great credit on the members producing them." A detailed statement of the many activities of the Branch during the year was also presented.

PRESENTATION TO HON. SECRETARY.—The Chairman, on behalf of the members of the Branch, presented Mr. Smith with a travelling rug as an expression of appreciation of the work which he had done, and the esteem in which he was held.

TATIARA (Average annual rainfall, 19in.).

August 5th.—Present: five members.

BLACKSMITHING ON THE FARM.—Farmers should only attempt the odd blacksmithing jobs they could do, and not try forge work such as difficult welding repairs, which result in a waste of iron, coal, and time, said Mr. T. L. Truman in a paper. Eye bolts could be made by anyone, because it was not necessary to weld the eye, which needed only to be bent round, and would never pull out. S hooks and C hooks could also be made on the farm. When a bolt dropped out of a plough or other implement it was a mistake to wire it up. Another bolt should be put in, and if there was not one in stock a makeshift could be improvised by making a piece of iron hot, screwing it up tightly in the vice, and beating a head on it. That was a much better contrivance than wire. A blacksmith's outfit should not cost more than £15 or £20, and should comprise a blower, anvil, hand and sledge hammers, set of dies, tongs, chisels, punches, and square. If a nut became stiff it was better to split it off with a cold chisel than to risk breaking the bolt. All old bolts and washers should be saved because they would come in handy at some time.